SAFETY MAINTENANCE & PRODUCTION

FORMERLY SAFETY ENGINEERING

AMERICA'S PIONEER MAGAZINE IN ITS FIELD | ENT. 1901 | JUNE, 1951 FIFTY CENTS

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HELMETS · HAND SHIELDS
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RESPIRATORS
GLOVES and MITTENS
LEGGINGS and SPATS
ARM PROTECTORS
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HY-TEST SAFETY SHOES

More and more businesses, stores, hospitals, schools and other public buildings are now using the new anti-slip waxes containing Du Pont "Ludox" colloidal silica. Tiny "Ludox" particles in floor waxes give new safety to walking.

Waxes containing "Ludox" have extra hardness. And waxes properly formulated with "Ludox" are fully equal to regular floor waxes in gloss, water-resistance, freeze-resistance and leveling. With all these advantages, you can see why waxes containing "Ludox" are specified by many safety and sanitation engineers.

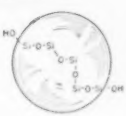
There are many different formulations already available to meet the specialized needs of institutions, business and industry. New anti-slip floor waxes containing "Ludox" are continually being developed by wax manufacturers in cooperation with Du Pont research men.

Make a point of asking your wax supplier to show you how his products containing "Ludox" help solve your floor-wax problems.

Grasselli Chemicals Department, E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Delaware.

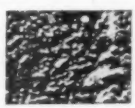
THE ACTION OF "LUDOX" IN WAXES

results from the structure of the individual colloidal silica particles. Each particle is a smooth, minute sphere—about one two-millionths of an inch in diameter. These spheres are clear and give wax films added transparency and depth of lustre.



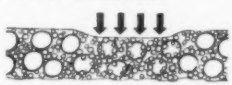
GIVES WAX MORE HARDNESS

Each wax particle gains extra hardness by being covered with many smaller, harder "Ludox" particles distributed throughout the wax film. This is shown in the electronphotomicrograph of the surface of a wax film, magnified 25,000 times.



GIVES WAX ANTI-SLIP PROTECTION

The pressure of a foot pushes the harder "Ludox" particles into the softer wax particles. The snubbing action which results makes the wax slip-resistant.



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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

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Facts

2% INJURIES

25% INJURIES

Goggles are a fine safeguard against accidents *to* the eye. But over 10 times as many accidents are caused by lack of proper vision from the eye. Eye injuries constitute 2% of your safety problem. Foul sight constitutes 25% of your safety problem.

Estimates on annual cost of these eye-caused accidents run as high as $475,000,000. Further, official Government statistics estimate that poor seeing holds back production anywhere from 25 to 40%. Yet goggles and glasses stay dirty and dangerous *unless you make it as easy as possible for workmen to clean them.* Accordingly, MAGIC LENS TISSUE was developed to attack the big end of your problem.

If you supply a rag, or ordinary fiber paper, lint and smears stick to most lenses. If you supply a small treated sheet it tears and one sheet doesn't do the job. If you ask your folks to fuss with a cleansing fluid, time is wasted by this old-fashioned method. No wonder jumbo-size, super-strong, silicone-treated MAGIC LENS TISSUE in its simple, compact, single-operation Dispenser has swept the alphabet of industry from American Can to Zenith Radio.

NO CUMBERSOME CABINET OR COMPLICATED DISPENSER

It polishes as it cleans. *Each sheet is over 50% larger than usual . . . yet it costs you less.* See how the lens-protecting silicone makes lint, dirt, dust and smears disappear like magic; makes cleaning easier, brighter, faster, more lasting—and easy as lifting your finger. See the lens sparkle.

It's General Electric Silicone—from the G.E. House of Magic—that does it; gives sparkling, crystal-clear sight on assembly lines, in workshops, refineries, mines, process and machine operations of every sort, offices, laboratories, engineering departments. NO FUSS. NO WASTE. NO FLUID. NO CUMBERSOME CABINET OR COMPLICATED DISPENSER.

GO MODERN—GO MAGIC. Wire or write us, or order through your Safety Supplies Jobber today.

IN A NEAT, COMPACT DISPENSER

Magic Lens Tissue

T.M.REG. U.S. PAT. OFF.

SILICONE TREATED

COMPARE THESE ADVANTAGES AND PRICES—AND DECIDE

SIMPLE, SELF-SERVING DISPENSER: Contains no moving parts. So compact (only 3¼" x 7¼" x 3½") can be placed elbow-close-on-the-job. No wandering around to use it. No lost time. Serves our especially interfolded MAGIC sheets one-by-one; as easy as lifting your finger. Secure. Lock and key feature. Indestructible. Strong 20-gauge cold-rolled steel construction. Baked enamel finished in beautiful National Safety Council Green. Does credit to any plant or office. Yet the Dispensers cost only $2.50.

INSTANT REFILL CARTRIDGES: 800 jumbo-size, super-strong sheets per packet (each sheet 5" x 6¼", instead usual 3" x 7".) Packed 6 Ready-to-Use individually-wrapped packets to the carton @ $1.40 per packet ($8.40 per carton). All prices FOB our factories. A lot more safety for a lot less money. Order today!

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General Offices: 230 Park Avenue, New York 17, N. Y.

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Happy Eyes *Stay* Happy...

when eye SAVERS stand guard!

Comfort and safety are assured — even on hot days — with MODEL 10G2 EYE-SAVER. A green frame with 18 or 32 air vents and shade No. 2 optical green shatterproof lens make it the ideal safety goggle—regardless of weather! Get complete details from your safety supplier or write direct.

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PROVIDENCE • RHODE ISLAND

WATCHEMOKET eye SAVERS

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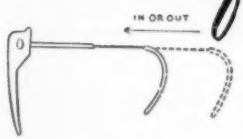
THE WATCHEMOKET **METHASPEC**

WATCHEMOKET eye SAVERS T. M.

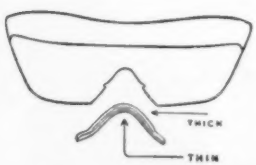
SAFE
STURDY
LIGHT
ATTRACTIVE

featuring



ADJUSTABLE TEMPLE LENGTH *For perfect fit,* the METHASPEC* retrax temples can easily be adjusted. Just push or pull each temple in or out to fit wearer's individual requirements. Paddle tips may be twisted into various positions for added individual comfort.

ADJUSTABLE LENS ANGLE *To fit every face,* lens angle is fully adjustable by moving temples up or down. To change angle, hold lens with one hand and move temple (at hinge) up or down with other hand.



REVERSIBLE BRIDGE *For added comfort,* bridge is thick on one side, thin on the other, and may be reversed so that either side touches wearer's nose. To reverse: Snap out bridge from notches in lens. Turn bridge around. Snap bridge back in lens.

* T. M.

ORDER FROM YOUR SAFETY SUPPLIER TODAY OR WRITE DIRECT

METHASPEC SPECIFICATIONS

- **Material**—UVA Plexiglas—ultra violet restraint 100% in range below 3400 ang. units (the range harmful to human eye).
- **Thickness**—$\frac{1}{10}$".
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- **Weight**—1-¼ ounces.
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- **Cost**—$1.35 per single goggle. Quantity prices on request.
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PROVIDENCE WATCHEMOKET eye SAVERS RHODE ISLAND

T. M.

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FORMERLY "SAFETY ENGINEERING"

The Magazine of Safety

Reg. U. S. Pat. Off.

A MONTHLY PUBLICATION DEDICATED TO ACCIDENT PREVENTION, MAINTENANCE, HEALTH CONSERVATION AND FIRE CONTROL FOR EFFICIENT PRODUCTION.
EST. 1901

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AMERICA'S PIONEER MAGAZINE IN ITS FIELD

SAFETY MAINTENANCE & PRODUCTION is indexed regularly by Engineering Index, Inc., New York

An informative discussion of dry chemical fire extinguishing agents with particular emphasis on factors responsible for quality and dependability.

. . . . by

Arthur B. Guise
Chief Engineer
Fire Extinguisher Division
ANSUL CHEMICAL COMPANY

— ANSUL DRY CHEMICAL — CONTROLLED QUALITY FOR CONSISTENT DEPENDABILITY

Your extinguishers can fail to operate when you need them most . . . or operate with less than maximum effectiveness and fail to extinguish the fire . . . unless properly maintained and charged with dependable first quality extinguishing agents.

This is equally true of dry chemical fire extinguishers.

Ansul *"PLUS-FIFTY"* Dry Chemical is produced under carefully controlled conditions to meet specific requirements. *This means that every container of Ansul Dry Chemical has the same uniform high quality.* Ansul Extinguishers are designed for use with Ansul Dry Chemical only and, if consistent high fire extinguishing effectiveness is to be obtained, Ansul Dry Chemical should be used for recharge purposes.

There are a number of factors influencing dry chemical quality and all must be controlled because variations in a dry chemical can affect its fire extinguishing effectiveness.

PARTICLE SIZE. The sodium bicarbonate in Ansul Dry Chemical must pass tests to insure that the size of the particles falls into a certain range. If a certain percentage of the particles are over a maximum given size, the fire extinguishing effectiveness of the dry chemical is measurably decreased. Ansul's quality control procedures insure that the fire extinguishing effectiveness is always high.

MOISTURE REPELLENCY. The materials and methods used to produce water repellency in the finished dry chemical directly affect its flow and packing characteristics and electrical resistivity. All dry chemicals will absorb moisture when exposed to highly humid atmospheres. Excessive moisture absorption causes caking of dry chemical and resultant failure of the extinguisher to operate. Ansul Extinguishers and shipping containers for dry chemical are weather-proofed to minimize the possibility of moisture absorption . . . and Ansul provides a further safeguard by furnishing a dry chemical which *can absorb four times more moisture than ordinary dry chemicals* without harmful effects to any of its characteristics.

FLOW. Ansul Extinguishers are designed to discharge dry chemical at a definite rate. Quality control during the manufacturing operation insures that Ansul *"PLUS-FIFTY"* Dry Chemical will flow at a sufficiently high rate to insure maximum fire fighting effectiveness.

PACKING. *All* finely divided solids tend to pack. Dry chemical is no exception. Daily tests of Ansul *"PLUS-FIFTY"* Dry Chemical as it is produced insure that every batch will fluidize readily. Proper design of Ansul Extinguishers doubly insures fluidizing of dry chemical and proper, effective, discharge.

ELECTRICAL RESISTIVITY. Ansul *"PLUS-FIFTY"* Dry Chemical has an electrical resistivity of 1000 megohms. Frequent tests are made to insure that all Ansul Dry Chemical is equally resistive and always safe to use on electrical fires. Again, Ansul Dry Chemical can absorb four times more moisture than ordinary dry chemicals without impairing its electrical resistivity.

SUMMARY. Ansul's Engineering and Research Departments have developed specifications and tests to control particle size, moisture repellency, flow and packing characteristics. Last year 3500 flow tests were conducted on Ansul Dry Chemical to assure uniformly high quality of the manufactured product. You are assured of consistently high quality and maximum dependability with Ansul *"PLUS-FIFTY"* Dry Chemical.

Send for your copy of File No. 674. You will receive additional technical information on dry chemical. Also included is printed material describing Ansul's complete line of Dry Chemical Fire Extinguishing Equipment.

"PLUS-FIFTY" DRY CHEMICAL IS MORE DEPENDABLE ALL-WAYS!

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CHEMICAL COMPANY
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THIS NAME ASSURES YOU OF QUALITY PRODUCTS

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It's Safe to Say

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★ HOW DID THE RACE SURVIVE?

WITH this issue we reach the 50th milestone in safety's march of progress. Even in this very young country, a span of fifty years is not very long as time is measured these days. And yet, as United States Steel's President, Benjamin Fairless, points out elsewhere in this issue, even Big Steel is only fifty years of age.

Therefore, it is with a mixture of pride and humility that we emphasize that SAFETY MAINTENANCE & PRODUCTION is the first magazine in its field to reach its Golden Jubilee. For that reason, a certain amount of celebration is in order and since a publication would find it impracticable to hold a birthday party for thousands of loyal subscribers, the best we can do is to bring the party to you in the form of a souvenir issue reviewing and illustrating the growth of safety from the days when the formal safety movement simply did not exist.

Incidentally, it has been a stimulating experience to pore over literally hundreds of old drawings and photographs showing old-time factory conditions now happily relegated to the past. Doing so, however, gives rise to the wonder that the human race managed to survive as well as it has done. In selecting such illustrations, an attempt was made to discard the purely "horror stuff" which can begin to pall and lose its impact with repetition.

Perhaps in time, 1951 pictures will appear equally outmoded to those who will come after us in the field of safety and plant maintenance. This must be so as, according to Mr. Fairless, "safety problems remain dynamic and their solution will continue to provide industry, as well as SAFETY MAINTENANCE & PRODUCTION, with many opportunities to use imagination and initiative."

A cross-section of top-ranking blue ribbon companies is represented by exclusive articles in this issue and we venture the opinion that one of the factors greatly contributing to the growth of those companies is their emphasis upon safety and good maintenance as the twins of production. In other words, U. S. Steel, Westinghouse, International Harvester, General Electric, American Tel. & Tel., and all the others who are our honored guests this month realized long ago that accidents retard production and can stymie the growth of any company.

Fortunately, it is a fallacy that only the larger companies can have a monopoly on accident prevention—their history offers sound proof to the contrary and would be the first to agree that a plant need not be a giant of industry to embrace the multiple advantages of safety. The neighborhood garage, the small manufacturer and the welding shop, regardless of size, can place accident control high on the daily agenda. Yes, even the receiving and packing rooms of the small department store as well.

Old-timers have a way of prefacing all their remarks with, "Now in *my* day," etc. This publication will do no such thing. We prefer to believe that *our* day is just beginning and that we will continue to follow trends and, where necessary, actually make trends looking toward a more widespread appreciation of safety and its benefits. In starting our second 50, we voice the hope that the contents of this issue will be found interesting, helpful and even stimulating to those thousands of unsung heroes who are devoting their energies to reducing our nation's needless sacrifice of life, limb and property. In short, we hope you like the "party," represented by this issue and will tell us so!

★ INFLATION HITS ACCIDENT COSTS

DESPITE jabberwocky discussions of price controls, roll-backs and the evils of inflation, the man in the street—and that's us—knows that he is caught in the middle of the Big Squeeze and that it is becoming increasingly difficult to keep just the nose above water, let alone the whole head. Therefore, one need be no crystal-gazer to figure out that the costs of accidents never have been higher. Medical costs, wage loss and production halts certainly must reflect today's rising prices with the result that the cost of a damaged eye, smashed toes or an infected finger is no more the same as it was in 1940 as the price of a pound of coffee.

If for no other reason than the need for watching spiraling costs—and there are plenty of other and more personal reasons—it is good business to review the increasing price of lost-time accidents and adopt drastic measures to plug the leak which can drain away profits faster than the tax collector. H. A.

"I PASSED A BLIND MAN *Today*"

1 SELL EYE SAFETY TO EMPLOYEES
Ask your distributor's representative to show you the kit of posters, pay envelope inserts, PA system scripts and other material that sells workers forcefully on *desire to use* proper safety eyewear.

2 SAFETY GLASSES FOR EACH JOB
A complete range of Bausch & Lomb safety eyewear, engineered to meet the most rigid tests for each job classification in your plant.

3 PROTECTION *PLUS* CORRECTION
For at least 50% of your workers prescription lenses are necessary to working efficiency as well as to safety. Your B&L distributor offers prompt prescription service on all types of industrial eyewear.

THAT'S the title of a story written to one of the workers now on your payroll.

Which one?

The "one" who is thoughtless—who understands the purpose of eye safety measures *only* when it's put to him dramatically, graphically.

"I Passed a Blind Man" is available now in a forcefully written pamphlet for pay envelope or other distribution—a tiny part of the *total* eye safety service performed by Bausch & Lomb for all firms interested in a *total* eye safety program. Write Bausch & Lomb Optical Company, 693-6 St. Paul St., Rochester 2, N. Y.

BAUSCH & LOMB *Safety Eyewear*

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LOST! 432,333,336 MAN HOURS

REPORTED FROM FALLING ACCIDENTS

Figure Covers Recent One-Year Period

FALLS RESPONSIBLE FOR 1 OUT OF 6 INJURIES

"Falls represent the second principal source of *all* compensable industrial injuries." Accident Facts, 1949.

DON'T LET SLIPPING ACCIDENTS COUNT YOUR WORKERS OUT!

. . . KEEP 'EM SAFE ON THE JOB with HILLYARD PRODUCTS UNDERFOOT

NON INFLAMMABLE

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REMOVER

Pries Hazardous Grease from Floors • Machinery • Equipment

An amazing fireproof chemical paint and varnish remover. Instant-acting. No sanding or scraping. Effective on metal or wood. Never before have you experienced such ease in removing stubborn grease, paint, varnish, other finishes.

and

so SAFE you can extinguish a match in it!

NON-SLIP

Hilco®-Lustre

adds a mirror-bright finish

The new surface safeguard, just released by HILLYARD. No equal as a floor renewer. Not like waxes or floor finishes that form a soft film and imprison dirt. HILCO-LUSTRE is rugged, hard . . . protects with a high glossy lustre that tests "anti-slip" for heavy industrial traffic. You can recoat major traffic lanes without refinishing entire floor surface.

Use Safely on

cement, linoleum, asphalt tile, tile, terrazzo, rubber tile

U/L APPROVED "ANTI-SLIP"

NO RINSE

SUPER SHINE-ALL

Cleans up on Floors and Accidents

Keeps entire plant clean and safe . . . woodwork, walls, floors, work benches. Drastically cuts housekeeping costs because it needs no rinsing. Not a soap—but a neutral chemical cleaner. Leaves no scummy residue to cause slipping accidents. Can't harm expensive installations. Does a fast, efficient job to save 50% in labor time.

U/L APPROVED "ANTI-SLIP"

FREE Slip-Test Folder On Request

Send for your copy today.

Contains interesting information on U/L tests. *Write Dept. V–6.*

Send for Your FREE Copy of The New Hillyard Catalog

Every maintenance problem from ceiling to floor is covered in this 48 page booklet now being mailed free on request. Dozens of "How-to" photographs—more than 100 specialized product listings.

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Maintaineer Warehouse stocks in principal cities.

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St. Joseph, Missouri

U. S. A.

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CORK OF THE WALK

Armortred

of course

Soles and Heels

Fourth of Five

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21–18–15–12–9 Iron

Light Weight

Long Wearing

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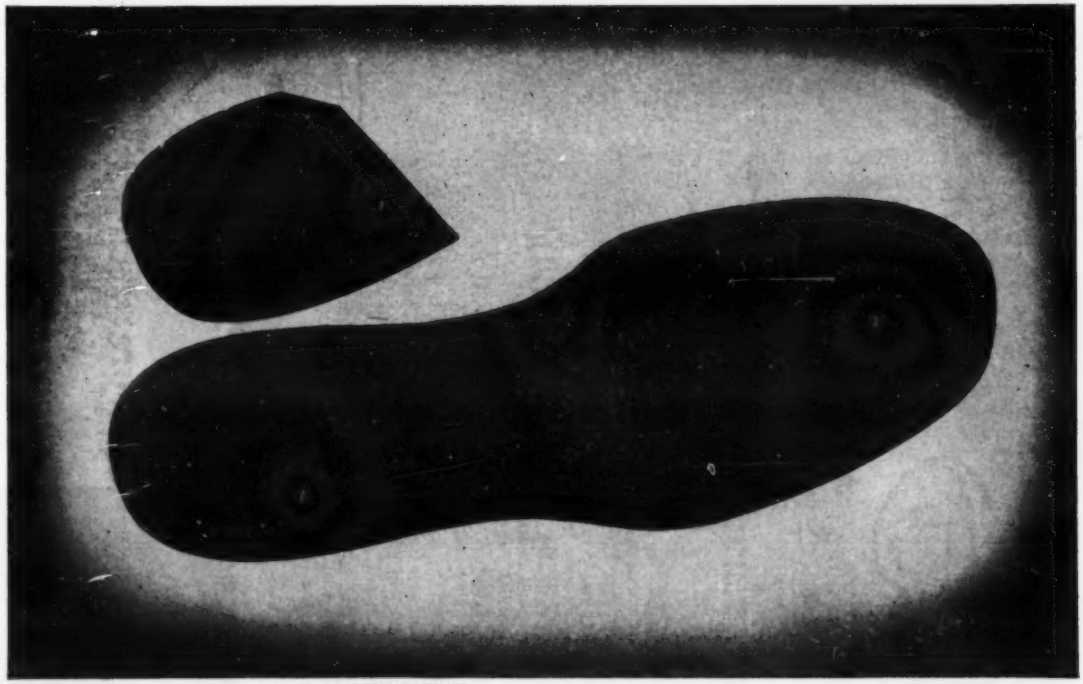

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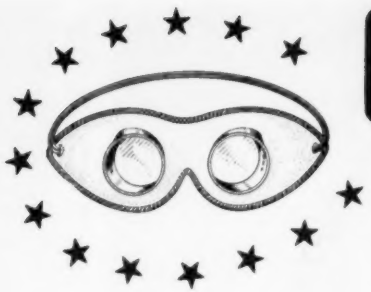

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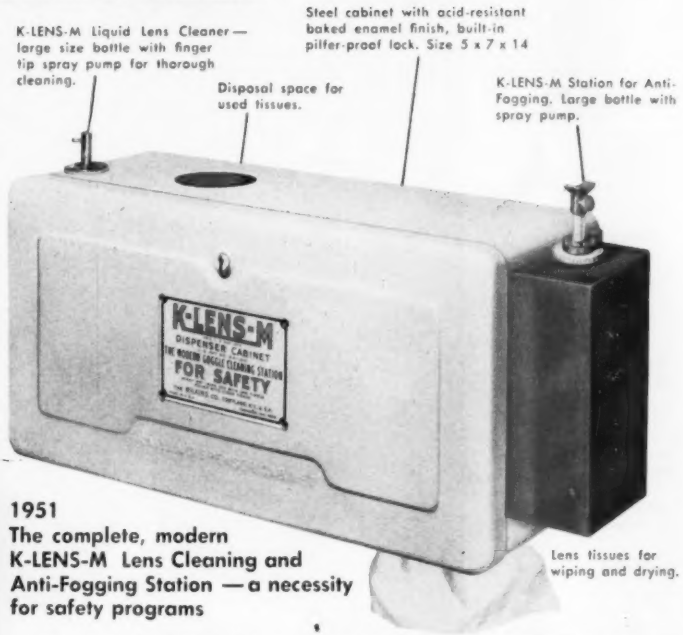
In 1908, when industrial safety goggles were perfected, the first big step was taken toward better eye safety in industry. However, protective lenses would get dirty or fog up, blocking vision, and workers, unable to work "blind", shoved goggles out of the way.

In 1942, when The Wilkins Co., Inc. introduced the original K-LENS-M Dispenser Cabinet, the first practical lens cleaning station, workers were able to clean goggles easily and *now*, with K-LENS-M Anti-Fogging Liquid can have clear protected vision regardless of working conditions.


K-LENS-M Liquid Lens Cleaner — large size bottle with finger tip spray pump for thorough cleaning.
Steel cabinet with acid-resistant baked enamel finish, built-in pilfer-proof lock. Size 5 x 7 x 14
Disposal space for used tissues.
K-LENS-M Station for Anti-Fogging. Large bottle with spray pump.
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DISPENSER CABINET
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Lens tissues for wiping and drying.

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The complete, modern K-LENS-M Lens Cleaning and Anti-Fogging Station — a necessity for safety programs

Today, with the **K-LENS-M** Lens Cleaning and Anti-Fogging Station, you can have clear, protected vision for your workers at all times. Whatever your plant conditions, your employees won't have to remove goggles or shields because of dirt or fog—and risk loss of eyesight.

Modernize your eye safety program with

K-LENS-M Liquid Lens Cleaner for thorough cleaning of glass or plastic eyewear.

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K-LENS-M Dispenser Cabinet with Anti-Fogging Station is a complete lens cleaning unit; easy to install, use and service.

To bring **clear** protected vision to your workers get the complete WILKINS **K-LENS-M** Service from your safety equipment supplier, or write direct to

The K-LENS-M Liquid Method means thorough cleaning of all eyewear.

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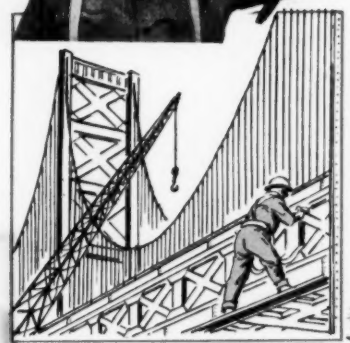
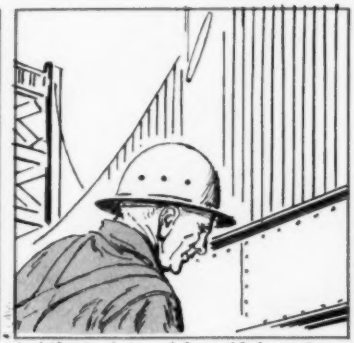
"Here's Two Reasons Why I'm Still Alive and Kicking"

Says Frank Kramer, Bridgeman, U.S. Steel's American Bridge Company



I was working on a bridge job in Ohio, when this happened. Except for two reasons, that would have been my last job.



A drift pin dropped from 60 feet above picked my head for a target. It was coming like a bullet. Somebody yelled, but there was no time to duck.

That pin struck my Skullgard. It would have bashed my skull . . . but Skullgards are tougher. The pin bounced off.

Bad luck wasn't through with me . . . that pin struck an I-beam, bounced back, and hit me full in the face. It felt something like getting kicked by a horse.

It knocked me right off the bridge beam. The undertaker was reaching for me again, but I fooled him a second time. Had my safety belt on.

The boys grabbed the safety line and hauled me up. I had a bloody nose . . . that's all. Skullgards and Safety Belts have got my vote for man's best friend ever since.

This true story—from the many in the files of American Bridge—explains why the company invests thousands of dollars annually in safety hats and belts alone. The equipment is bought for *protection*—but it pays extra dividends in production, through the added confidence that it gives to every worker.

American Bridge management says, "We are sold on safety hats . . . and so are our workmen. There is no law that compels them to wear Skullgards, but most men would no more think of going on the job without helmets than of working in their bare feet. Once a man has seen how a helmet can save a life or prevent serious injury, he doesn't need urging to wear one."

M.S.A. Skullgards are safety-engineered for maximum protection . . . carefully designed for maximum wearing comfort. Choice of several types of linings, that can be easily removed, replaced, and adjusted for any head size. For complete details, ask for Bulletin DK-15.

Call the M.S.A. man on your every safety problem . . . his job is to help you.

MINE SAFETY APPLIANCES CO.

BRADDOCK, THOMAS and MEADE STS., PITTSBURGH 8, PA.

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SAFETY MAINTENANCE & PRODUCTION

VOL. 101, NO. 6 • JUNE, 1951

From the collection of the Bettmann Archive.

The Accident In The Machine Shop. ***From the painting by John Bahr.***

THE STORY OF SAFETY

A 50-Year Review

By HENRY ARMAND

FIFTY years ago, there was no organized safety movement for the protection of the industrial employed. Industry had always been plagued by accidents, fires and occupational sickness. And already this needless burden had begun to take a mounting toll in suffering, tragedy and financial loss, shared in by every citizen of the land. At that time the practical aspects of accident prevention were not widely accepted in all lines of industry. There was no large scale market for protective equipment to combat industrial hazards and there were no general workmen's compensation laws to relieve the financial suffering caused by accidental death or injury . . . laws which were to serve as a deterrent to such casualties and to act as a major incentive to their control.

At the turn of the present century, industrial hazards were considered a normal, and even inevitable, part of factory and plant operation. In the early 1900's, a handful of inspectors and engineers employed by the fire and casualty insurance companies and a small group of men on the staff of the country's leading industrial concerns formed the nucleus of the safety movement which was destined to grow as a potent force in a comparatively short span of time. It was then that safety had begun to take its first step in the path of a ray of light whose torch was lit by that small group of pioneers.

There were no state, regional or national safety conventions—no forceful dynamic displays of protective equipment to add dramatic impact to accident prevention programs. It was not until much later in this half-century that we saw periodic and regular expositions of essential safety devices and products. In other words, safety's productive function insuring uninterrupted operation of industry through the protection of personnel and property was, if considered at all, thought highly unrealistic and a Utopian dream.

Fifty years ago, the entire safety movement seems to have been born in the area bounded by fire protection alone. This was natural—the spectacular always rivets attention and captures the imagination. Smoke and flame represented the tangible and the visible, and were

immediately reflected in tragic loss of life and great property damage. For that reason, contrasted with ordinary accidents, total loss caused by fire was not considered "normal" or "inevitable." Thus the application of fire control measures stimulated thinking along preventive lines in other hazardous work areas and safety activity began to take form and grow.

The role of the industrial safety engineer was not yet properly established. Few industrial plants —even those employing thousands of men—saw the need of building safety into their industrial processes. In fact, it requires no stretch of the imagination to assume that safety leaders in the early days were viewed somewhat suspiciously and characterized as fanatics! Today fortunately all industry realistically pays honor to the technically trained professional safety director. His contribution to human welfare over the years, his struggle to maintain safe, efficient production and his accomplishments in relieving tragic aspects of suffering and in reducing preventable losses—all these gains are beyond any possibility of measure.

Safety's Chief Enemy

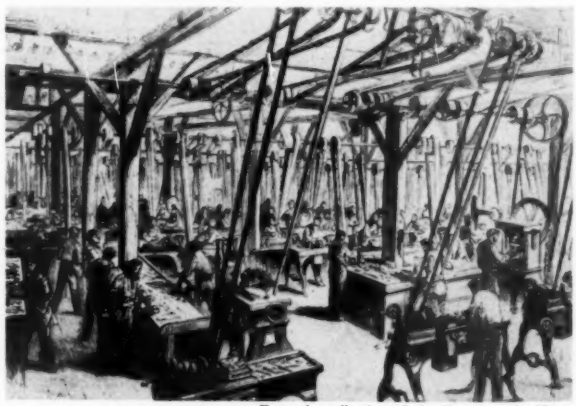
Fifty years ago a tiny glimmer of light began to focus on a major accident cause in all industries . . . slipping accidents and falls. Although exposure to this specific danger always will persist so long as the men must walk or stand, plant management has learned that the hazard can be greatly minimized. Today, high standards for maintaining safe walkway surfaces are the greatest safeguard for controlling this ever-present enemy. Industry has learned to its entire satisfaction that there are no "minor" slipping hazards. A grease spot, a worn tread, faulty ladder, a rutted floor, a trailing wire may cause one false step with tragic results.

Dust Explosions

Violent explosions occurring both before and after fires were responsible for great loss of life and huge property damage in the early days of this century. In certain mills and factories, atmospheres charged with explosive mixtures were a constant menace where open lights were common-place and sparks flew. With the sudden impact of a bomb, pulverized substances blasted away entire walls, raining down death and destruction upon all those in the path of danger. Operations involving the processing of flour, starch, sugar, grain, sawdust, charcoal and coal were especially vulnerable to explosion in the absence of control measures developed in later years.

Today regulations banning open lights in the presence of hazardous dusts, fumes and vapors—together with scientifically designed ventilating systems, spark-proof tools, equipment and apparel—to say nothing of building with an eye to possible danger—all contribute toward protection against dust explosions.

Stationary and portable factory vacuum cleaners, blowers, modern air-conditioning apparatus, protective equipment and mandatory codes for safety construction demonstrate, day by day, that hazard control is the first step in the prevention of disaster. Plants designed for safety are most certain to survive and their personnel to live out their allotted span of years. Only through constant attention to proper maintenance of these safeguards can *(To page 118)*



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Scene for a slaughter. In the pre-safety age, employees were endangered by unguarded transmission belts, lack of safety goggles and shoes, and poor lighting.

THE WHITE HOUSE
WASHINGTON

March 26, 1951

Dear Mr. Armand:

Congratulations upon attaining the Golden Anniversary of the Nation's first publication dedicated to highway and industrial safety.

The promotion of safety has been one of my most constant goals. I believe it should and must be the goal of every American.

American lives are too precious to be sacrificed through avoidable accidents. We have made great strides in reducing the rate of accidents in recent decades. We must make more. Even in these bitter days when our men are fighting in Korea, we are losing more lives through accidents at home than we are losing on the battlefields.

I hope you and all other organizations and individuals will continue your efforts to reduce the toll which accidents take in lives and limbs.

Very sincerely yours,

Harry S. Truman

Mr. Harry Armand,
Editor,
SAFETY MAINTENANCE & PRODUCTION,
75 Fulton Street,
New York 7, N. Y.

A scarfer at a U. S. Steel mill is protected by safety clothing.

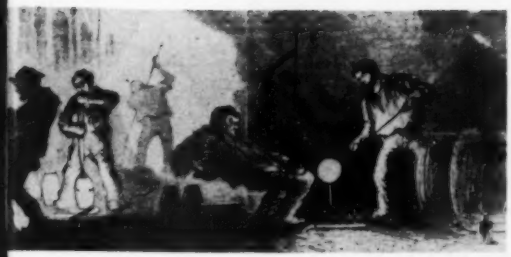
SAFETY'S DYNAMIC AT

By BENJAMIN F. FAIRLESS
President, United States Steel

ALONG with SAFETY MAINTENANCE AND PRODUCTION, the United States Steel Corporation is celebrating its fiftieth anniversary this year. Both have grown up together. For 50 years United States Steel has served the nation, meeting the constantly growing demand for steel products. During the same period SAFETY MAINTENANCE AND PRODUCTION has provided the country's industries—both large and small—with valuable information about safety methods and techniques. The steel industry—which very early adopted safety as an integral part of its operations—has recognized and welcomed the many contributions of magazines in the field of safety.

United States Steel undertook an organized approach to safety on a large scale in 1906 when casualty managers of the subsidiary companies met to consider the problem of reducing accidents. At the second meeting two years later, Judge Gary, then chairman of the board, expressed U. S. Steel's serious intentions when he stated: "We should like to take a prominent part—a leading part—in any movement and in every movement that is calculated to protect employees of the different corporations in which we are interested, and any requisition which is made for the expenditure of money to install equipment to protect our people will be honored."

These first safety programs in the steel industry were met with skepticism by many workers, and, as a result, the early leaders of safety programs had a real problem on their hands. They had to combat the spirit of bravado which encouraged men to take chances, and this assignment was frequently difficult. Active opposition to safety methods was replaced by an apathetic, uncooperative spirit which was—and still can be—a



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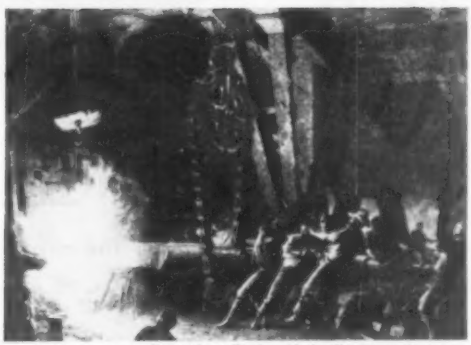
A woodcut of 1871 shows unprotected workers melting steel by hand in a smoky, dust laden, poorly ventilated pre-safety mill.

At right, a steelworker in a U. S. Steel open hearth shop pauses to tie his safety shoes. The asbestos coat and gloves insulate him from heat, and goggles will shield his eyes from injury.

During its 50-year growth, United States Steel has forged a successful safety program, but the future holds new challenges for the safety movement and American industry.

BIG STEEL!



From the collection of the Bettmann Archive.

Workers in a nineteenth century iron foundry had little protection from heat and very primitive equipment for handling.

serious obstacle to safety progress. It soon became apparent that it would take great effort and ingenuity to make steelworkers safety minded.

Safety leaders concluded that preaching and issuing orders were not enough. They felt they would have to arouse a lively interest in their campaigns, so they contrived traveling shows built around the theme of safety but mixed with entertainment which aroused the steelworker's sense of humor. These shows, along with rallies and contests, were all a part of an expanding educational program and were very popular in Pittsburgh and the surrounding mill towns.

Supervisors in subsidiary companies joined actively in the movement and closely followed recommendations of the safety engineers. They placed guards *(To page 103)*

Safety and health were carefully considered by U. S. Steel in the designing of this clean, modern hot strip mill shown below.

Who was the real Fall Guy?

The man who fell on the slippery floor?

or

The man who owned the building?

Everybody laughs when a fat man falls.

But it isn't funny to the fat man. Nor to the thin man or the slim woman. Or whoever else breaks a bone, falling on a slippery floor.

It isn't much of a joke to the building owner, either. He turns out to be the real "Fall Guy" when he is haled into court.

If you want to avoid negligence suits, call your LEGGE Safety Engineer today. Without cost or obligation, he will make an on-the-spot survey of your floors, show you how you can have gleaming surfaces *without slipperiness.*

Ask him about other companies, plants and institutions which have reduced slip-fall accidents up to *98%*, at the same time saving 50% on material and 25% on labor. This analysis service is FREE.

Don't wait for trouble—*act today!* Write WALTER G. LEGGE COMPANY, INC., 101 Park Ave., New York 17, N. Y. Branch offices in principal cities. In Toronto—J. W. Turner Co.

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MR. HIGBY LEARNED ABOUT SLIPPERY FLOORS—*the hard way.* Send for this easy-to-read entertaining booklet. Full of facts about floor upkeep. Just fill out and mail the coupon.

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Please send me a free, no-obligation copy of your *Mr. Higby* book.

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YOU'RE SAFE WHEN YOU HAVE LEGGE TO STAND ON

LEGGE SYSTEM
of Safety Floor Maintenance

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From the collection of the Bettmann Archive.

Saw-grinding was an extremely hazardous operation in the nineteenth century. Safety devices were entirely lacking.

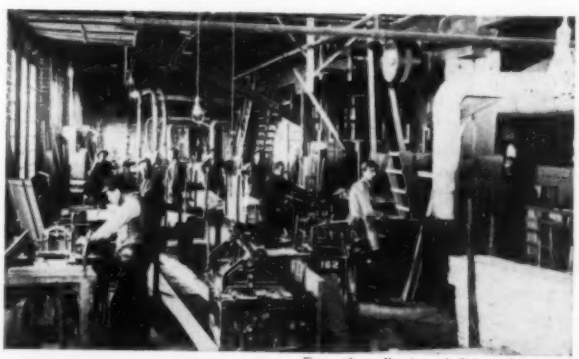
Loss Control Comes of Age

By GEORGE E. PETERSON
Vice President
The Travelers Insurance Company

Casualty insurance companies and their industrial engineers have played a decisive part in overcoming, in about twenty-five years, a century of indifference to accidents.

IN AN age of industrial and scientific miracles, one of the most frequently overlooked phenomena is the "coming of age" of safety engineering and loss control. From a state so low that its practitioners met with indifference if not active opposition in the '20s and before, industrial accident prevention has risen to become an accepted science which rapidly is getting results.

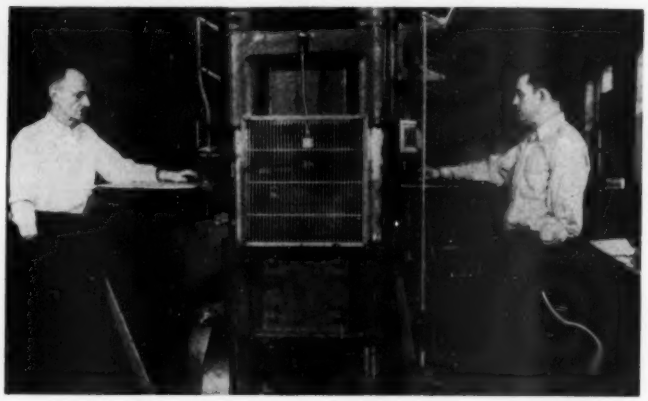
Skeptics who feel that deaths and injuries are a normal by-product of an industrial operation need only to check into the statistics to



From the collection of Culver Service.

A woodworking shop of several years ago when the safety movement was getting underway. Note exhaust ducts, and wooden guard for belt at right center. Saws were still unguarded.

The Machine that "Couldn't Be Guarded"—It was believed for many years that the embossing press shown at left could not be guarded. The picture shows the action of one of the two operators and also how the machine could make a tragic record of one amputation for every ten man-years of operation. The same machine is shown below equipped with a guard developed by O. D. Bayrer of the Engineering and Loss Control Division of the Travelers. The men shown had operated the press before the guard was attached and had each lost a hand. Since this guard and many similar guards on related types of machines were installed, there have been no amputations of operators' hands.



be convinced otherwise.

In 1938, ten years after the first satisfactory estimates of industrial deaths became available, the National Safety Council reported, "If there had been as many occupational deaths in each of the last 24 years as there were in 1913, the aggregate death toll would have been about 285,000 greater than it was. This is a measure of the success of accident prevention activities in industry."

Amazing as it may seem, no one knew exactly how many workmen were killed or injured in industrial plants prior to 1928. However, in the period 1913 through 1927, conservative estimates put the number killed annually in industrial accidents at about 35,000. By 1937, that toll had been cut by safety engineers to 19,500.

Thanks largely to casualty insurance companies and to the industrial engineers in their employ, nearly a century of indifference was overcome almost completely in about 25 years.

19th Century Casualties

The early years of the 19th century were dominated by the growth and development of mechanization of industry. As factory personnel grew, so did the number of accidents. England, the cradle of mechanized industry, actually made some factory inspections as early as 1833, but not until 1850 were actual improvements in working conditions apparent.

In Lowell, Mass., there was cotton manufacturing in 1822. The same problems obtained there as in early industrial England. Most employees were women and children and help for those workers was slow in maturing. It was not until 1867 that The Massachusetts legislature passed a law requiring appointment of factory inspectors. Two years later the first Federal Bureau of Labor Statistics was established.

Men who make a business of researching the subject are amazed at the prosaic occurrence of industrial accidents, particularly during the last 50 years of the 19th century.

Boiler explosions were one of the most violent and, during some decades, the most frequent of big factory disasters. Flimsy buildings collapsed under the weight of machinery—or even of snow—with fatalities by the score. Flywheel explosions were continually occurring, sending great fragments with projectile speed through everything in their way—including brick walls and the people behind them.

If you were to run through a few weeks' issues of the newspapers of almost any major industrial community during the last half of the last century, you would find, as commonplace news, item after item telling how some incautious workman was caught on a rapidly spinning shaft, or drawn into a gear train, or had fallen into a vat or been burned fatally in a flare-up of materials in process.

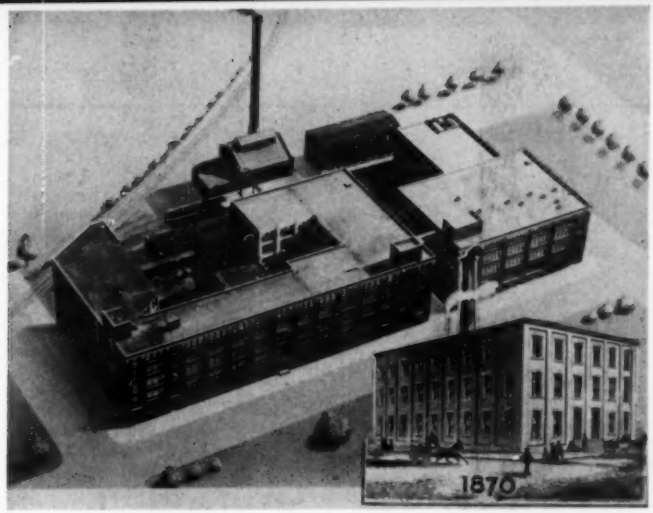
The First Safety Engineer

The first full-time safety engineer in America was The Travelers' Tommy Harkins. The founder of The Travelers, James G. Batterson, who also was its President, hired Tommy Harkins because he felt some accidents could be prevented. That was in 1894. Harkins had been a foreman in an elevator plant. Batterson made him an elevator inspector in New York City and he was a success.

A few years later Mr. Batterson took another revolutionary step—he hired an industrial safety engineer.

This man's assignment and recommendation ended in failure and subsequent tragedy. After inspecting a street railway, he recommended a certain guard be constructed at a sharp curve. The company refused to carry out his recommendation and a few months later an accident *(To page 118)*

By THOMAS A. WILLSON
President,
Willson Products, Inc.



The contrast of the Willson Products building of 1870 with the company's present facilities typifies the expansion of accident prevention since its pioneering days.

SAFE EYES LOOK BACKWARD

A review of the great strides made in eye and respiratory protection, with a look at possible future developments.

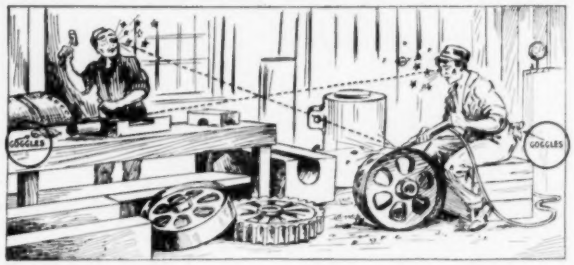
ANNIVERSARIES traditionally cause us to stop and look back over the years, and Fiftieth Anniversaries have come to have a special significance. It is a considerable achievement in any field to maintain a successful business for fifty years. It requires skill and good management, and a consistently fine product. But even these are not enough without a growing need for the product. SAFETY MAINTENANCE AND PRODUCTION has had the good fortune—and the heartaches—of pioneering a new industry from almost the very beginning.

We say "almost" the very beginning because our company began the manufacture of the earliest type of industrial eye protection—tinted lenses—thirty-one years before 1901, the founding date of that publication, formerly known as "Safety Engineering."

The Franklin Institute Silver Medal, awarded to the Willson company in 1874.

One of the earliest industrial uses of colored glass was the blue shade used in furnace work. As a matter of history, the science of eye protection from 1870 to the early 1900's was practically confined entirely to glare protection in the form of various tinted lenses or combinations of tinted lenses. As early as 1874, we were awarded the Franklin Institute Silver Medal for "skill and ingenuity" in the development of tinted spectacles. A real attempt to produce a clear lens safety goggle along the lines of current models was made about 1908.

The history of safety goggle development from that point until



These Men Are Dangerous to Their Fellow-workmen.

WHY?

Because they do not care where the chips from their chisels fly.

WHAT ARE THEY?

Thoughtless Workmen who have not learned the value of an eye.

An early safety poster warns workers to wear their goggles.

about 1916 is almost entirely the history of glass research. Early safety goggles offered a degree of protection from impact in ratio to the thickness of the glass. This was definitely undesirable, because there were obvious limitations as to how thick the glass could be, and, regardless of thickness, the glass used was extremely brittle. Thick glass alone was not the answer. The search began for a glass of unusual toughness but without the brittle characteristics of ordinary glass. Many different processes were tried, including double lenses, and laminated lenses. Annealing was an early attempt at modifying the breakage characteristic of glass by *removing* the stress pattern. All these processes had their disadvantages, either from an optical standpoint, or unsatisfactory resistance to impact.

Early model of a dust goggle.

The Big Advance

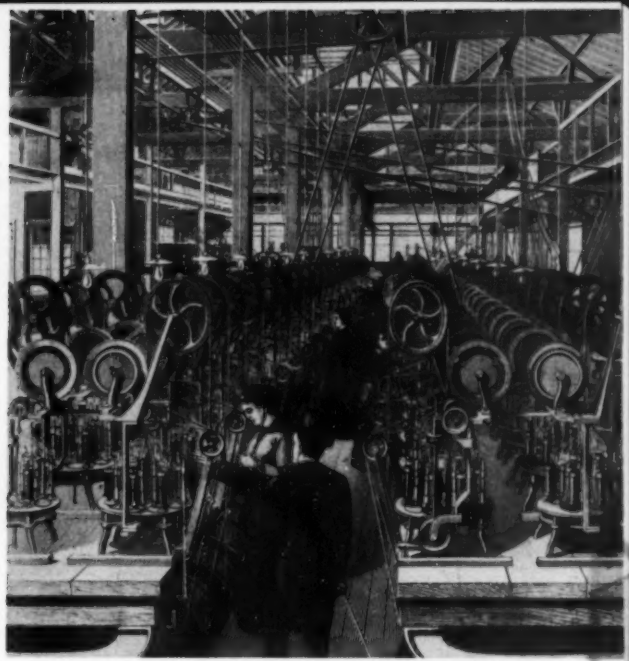
As early as 1915, experimental work was in progress on the heat-treating process for safety goggle lenses. This was the opposite of the annealing process, for it set up a definite uniform stress pattern instead of removing the stress. Properly heat-treated glass was found to have the necessary toughness rather than brittleness. As an additional characteristic, it was found to have a relatively uniform break pattern. Some time later, it was discovered that by means of polarized light, it was possible to see the heat-treat pattern in a lens, making it possible to reject non-standard lenses. The development of heat-treated glass made possible for the first time the manufacture of goggle lenses that could be relied on to give a fairly uniform degree of protection. It seems safe to say that heat-treated glass gave the eye portection industry its greatest single advance.

It was about 1916 also that the design of safety goggles began to get considerable attention. Up to this point, nearly all goggles were of the spectacle type. In 1918, this company developed its first cup-type goggle, which gave protection to the eye from all angles. From 1918 until the present, many improvements have been made in both spectacle and cup-type goggles. The modifications have been largely in the direction of greater comfort and style, in an effort to increase the willingness of workers to wear them. Other variations in the basic cup goggle styles have been made for specific industries, as, for example, the rubber mask goggle for chemical workers.

In the 1930's, non-flammable type plastics began to come into use for face and eye protection. The now common face shield was the first of many plastic devices for face and eye protection. The box-type cover-all plastic goggle,

One of the early respirators.

followed and has seen much wider use. Plastics had the advantage of comfort and light weight, but they were not immediately accepted by all parts of industry. Although not adaptable to every industrial eye hazard, their *(To page 106)*



From the collection of the Bettman Archive.

An early wire insulating factory shows lack of safety awareness: unguarded gears and belts, narrow aisles, dangerously clothed workers.

BELL'S ON ITS TOES!

Accidents in maintaining the far-flung lines of the Bell Telephone Companies have been reduced to a minimum because they insist that there is always time to do every job safely.

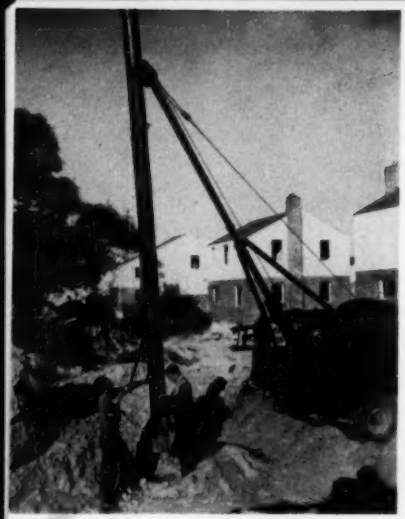
"GOSH, I certainly am glad I have had safety training!" exclaimed a telephone repairman to his supervisor recently.

Echoes of this fervent exclamation are heard almost weekly somewhere in the Bell System as the knowledge gained in company-sponsored safety courses proves to be the difference between life and death for an accident victim.

The telephone repairman who was so thankful for his safety training had just returned from the hospital where he had taken a small boy. The boy had fallen through a basement window and his leg was nearly ripped off by broken glass. The repairman, who happened to be working in the home at the time, applied a tight compress to stop the bleeding and rushed the boy to medical aid. The doctors told the repairman the boy would have bled to death had he not received prompt and effective assistance.

By F. R. KAPPEL
Vice President
American Telephone & Telegraph Co.

All of us in the Bell System believe in safety and have carried on a comprehensive safety program for many years in all departments. As a result, the telephone industry is near the top consistently in the National Safety Council's annual safety report. Lost-time injuries



Modern power equipment, such as this pole-setting truck, makes the telephone job less arduous, more efficient . . . and safer.

As new, safer methods of performing work are developed, they are put into use in the Bell System. Elevated platform on cable maintenance truck permits safe inspection.

last year, for example, were only .90 per million man hours in the Bell System's plant department. We consider it one of our top responsibilities to keep it there and improve it.

The plant department consists primarily of 157,000 men engaged in the engineering, construction, installation and maintenance activities of the telephone business. They operate some 55,000 trucks and other motor vehicles. They use a variety of power-operated tools, climb poles, come in close contact with winches and cables, and handle heavy equipment. Much of their work is done on busy streets, in the underground systems under the streets or along highways during all kinds of weather. Sleet and windstorms often under blizzard conditions, and hurricanes as well, cause broken trees, poles and wires. Rubber gloves, other protective equipment and special precautions prevent accidents at the time of such increased exposures. It is easy to see, therefore, why telephone men are proud of last year's safety record.

Despite the present good safety record, none of us in the business is satisfied. There still is more that can be done to make the job even safer.

A study of accidents that do occur in the telephone industry indicates that perhaps the greatest improvement in safety will come from giving special attention to the "human" factors.

The Bell System has a safety slogan that any telephone man or woman can tell you about. We see it in every company vehicle we drive, on every bulletin board, and in all safety information material. It is:

> NO JOB IS SO IMPORTANT AND NO SERVICE IS SO URGENT—THAT WE CANNOT TAKE TIME TO PERFORM OUR WORK SAFELY.
>
> BELL SYSTEM

In the attack on the human failures which are responsible for most accidents, emphasis is given to the stimulation of interest and friendly rivalry. This is accomplished through publication of comparative reports, informal "contests" between districts, periodic progress reports, and similar activities.

All this tends to create and maintain alertness to accident possibilities. However, there is no detraction from the importance of proper tools, correct methods, and the use of safety guards.

That these efforts have been successful is evidenced by the steady improvement in the Bell System's Plant safety record during the last nine years. During this period, the accident frequency rate for these men has been reduced from 3.34 to .90 lost-time cases per million man-hours of exposure.

At the start of this period, some of the telephone companies operated year after year with a lost-time frequency rate of less than one, while other groups had frequency rates of six or above. The difference was marked even though they all performed the same type of work, used the same type of tools, drove the same make of trucks, and employed the same calibre of personnel.

The solution to the situation was to adopt the practices and procedures that had *(To page 101)*

Central office for local and distance calls. Oakland, Calif., 1884.

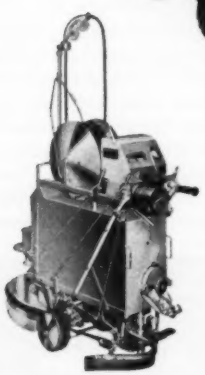
NEW SCRUBBER-VAC

Cuts Cleaning Time 2/3

FOR SMALL-AREA FACTORIES

- Specially designed for buildings with 2,000 to 15,000 sq. ft. of floor space
- Applies the cleanser, scrubs, rinses, and picks up in ONE operation
- Also handles the dry work — steel-wooling, polishing, et cetera
- Can be leased or purchased (leasing budgets cleaning expense)

Now the labor-saving advantages of *combination-machine-scrubbing* are available to small as well as larger factories. The *new 418P Finnell Scrubber-Vac*, for small-area buildings with 2,000 to 15,000 sq. ft. of floor space, cleans floors in *approximately one-third the time* required with a conventional 15 or 18-inch scrubber-polisher using separate equipment for picking up. A *Finnell Scrubber-Vac* speeds cleaning by handling four operations in one! It applies the cleanser, scrubs, rinses if required, and picks up (damp-dries the floor) — all in a single operation.



Of narrow design, the *new 418P Scrubber-Vac* also meets the need in larger factories for a combination machine that can be used in congested areas and narrow aisles. And all the refinements of *Finnell's* larger combination machines are embodied in this smaller unit (18-inch brush ring). Has new type of water valve that *assures* uniform flow of water . . . powerful vacuum for efficient pickup (performs *quietly*) . . . a *Finnell-developed* trouble-free clutch . . . self-winding cable reel . . . improved waterproof wiring and minimum electrical connections, simplifying the cleaning of the machine . . . G. E. Motors and Timken Bearings. The machine is self-propelled—operator merely *guides* it. Supplied with or without powder dispenser. Incidentally, it's good to know that when you choose *Finnell Equipment*, a *Finnell* man is readily available to help train your maintenance operators in its proper use.

SEE IT IN ACTION ON YOUR OWN FLOORS!

Find out what *you* would save with a *Finnell Scrubber-Vac*. *Finnell* makes several models and sizes. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 4306 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Pioneers and Specialists in

FLOOR-MAINTENANCE EQUIPMENT AND SUPPLIES

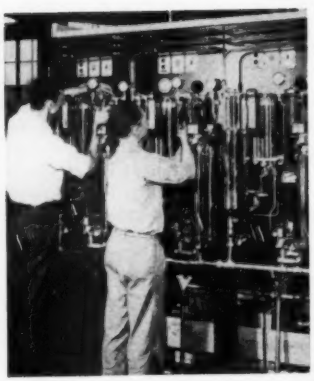
BRANCHES IN ALL PRINCIPAL CITIES

Please use a F-17 on prepaid card for further details.

Miner's Lights From

Safety . . . . . .

SAFETY THEN . . . Canaries like this were used extensively once to detect carbon monoxide and oxygen deficiencies in mines. Science has since perfected reliable instruments for this same purpose in mines and industry to protect workers.



SAFETY NOW . . . Here is a modern carbon monoxide recorder, a highly scientific and extremely accurate instrument to measure concentrations of carbon monoxide. This particular instrument is used in the Holland Tunnel in New York City.

By J. T. RYAN, JR.
Executive Vice President
Mine Safety Appliances Co.

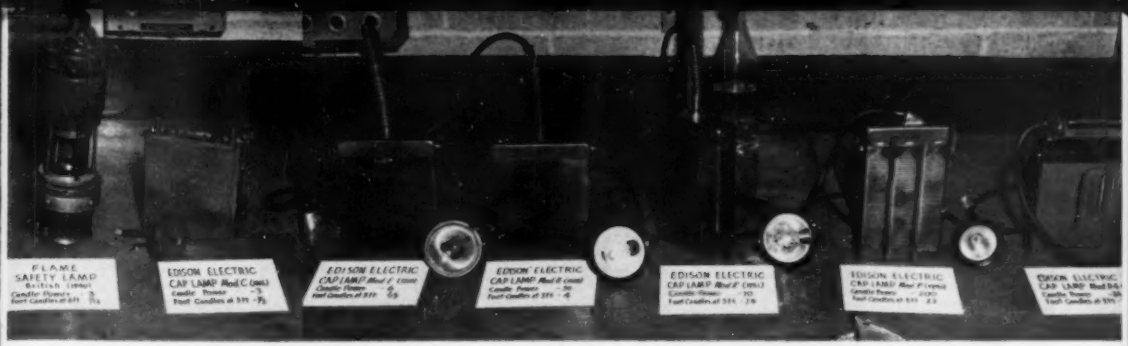
IN ANY analysis of the progress that industrial safety has made during the past half century, two facts stand out prominently. One is the increasing amount of importance industrial managements have attached to the problem of protecting workmen on their jobs. Greater recognition is given to this problem today than ever before. The second factor is the use of all branches of science and engineering in developing apparatus and equipment to safeguard life and property.

Safety-minded executives of modern American business have placed the welfare of employees on their jobs above every other consideration; American workmen have been given better tools, better industrial practices, better engineering and better safety equipment. Management has learned that in addition to the prime humanitarian reasons for a safety program such a program has a sound economic basis as well.

Behind the scenes of the industrial safety movement are the scientists who develop and perfect the many kinds of safety apparatus, instruments, wearing apparel and equipment so vitally needed to protect our American workers. Because lives depend upon it, safety equipment must be checked and rechecked from every conceivable angle in the laboratory and through experimental use before it can be employed with confidence. It has to be practical, simple to use and

SAFETY THEN . . . Early method of resuscitation involved strapping a victim in this mechanical artificial respiration device and safely administering oxygen under continuous flow with an inhalator, replacing lungmotor or pulmotor.

SAFETY NOW . . . The modern method of reviving victims of any type of asphyxiation is automatic artificial respiration instrument that administers oxygen on a regular cycle. When in use, no manual resuscitating method is necessary.



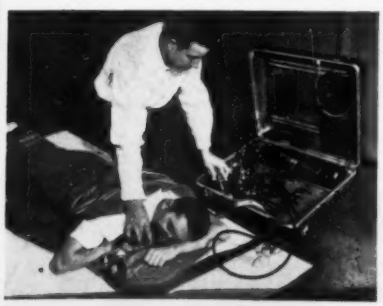
The Dim Past To Now

. . . . . THEN and NOW

operate, foolproof, durable, and in the case of personal protective apparatus, comfortable to wear. It must be manufactured of the best material because it must be reliable.

Chemists, physicists and various types of engineers all play an important role in the ever-changing industrial safety needs. New processes, new materials and their resulting hazards constantly pose a challenge to our "safety scientists" to devise new ways and means of keeping men out of danger.

Industrial safety as we know it today had its first real start back in 1910 when the Bureau of Mines was organized under the Department of the Interior. Today, this bureau is the final authority for testing and approving certain safety equipment used not only in mines but throughout all industry.



SAFETY THEN . . . Eight types of rescue breathing apparatus and gas masks developed over the years are shown in this photo.

SAFETY NOW . . . This modern breathing apparatus generates its own oxygen and provides protection against oxygen deficient or gas-contaminated atmosphere. Self-contained, it's easy to wear.

An idea of what these men have accomplished over the years is reflected by the history of the Mine Safety Appliances Company. When MSA was founded in June of 1914 by my late father, J. T. Ryan, Sr., and his partner, George H. Deike, Sr., now president of the company, it was a jobbing firm only. It had no manufacturing facilities of its own. Most safety equipment then available had to be imported from abroad. Because Mr. Ryan and Mr. Deike had been mining engineers, the initial objective of this new company was to supply the mining industry with safety equipment. Both men as Bureau of Mines engineers had witnessed firsthand the human suffering and other tragic consequences of mining accidents. They were determined to devote their lives to lessen the likelihood of these disasters. MSA began business with five items—a flame safety lamp, a resuscitation device, a breathing apparatus, safety signs and first aid supplies.

The flame safety lamp, originally developed by Sir Humphrey Davy in England, was *(To page 91)*

ON-THE-JOB TRAINING. It is the supervisor's responsibility to sell safety to employees by demonstrating the use of safety features incorporated in modern machine tools.

INTERNATIONAL HARVESTER Found the Key

By J. W. YOUNG
General Supervisor
Industrial Safety
International Harvester Co.

Man-maintenance is just as important as machine-maintenance and, to be successful, requires a clear understanding of people.

HARVESTER is proud to be numbered among those companies and industries that early in this century realized that an employer must take a human interest in the welfare of its people if it is to progress. In fact, its organized accident-prevention activities took form back in 1908, and early in the following year the management appointed eighteen of its plant managers and one special representative to develop a safety program. This, then, was the first of the concerted efforts within the company to eliminate the needless waste of manpower, materials and equipment which results from accidents.

As further evidence of this company's concern for the welfare of its employees it announced and put into effect "a voluntary accident relief plan" more than two years in advance of the first state laws on compensation for industrial accidents. The intent of this program was expressed as follows:

The purpose of this plan is to ensure to employees at the works, twine and lumber mills, and mines prompt, definite, and adequate compensation for injuries resulting from accidents occurring to them while engaged in the performance of their duties; and also to provide compensation to the widow, children, and relatives who may be dependent upon any employee whose death results from such accident. The benefits provided for by this plan will be paid regardless of legal liability on the part of the company, and no injured employee will require legal assistance to collect the money to which he is entitled.

From the collection of the Bettman Archive. Tempering springs in 1873.

As might be conjectured, early activities in developing the safety

STONEHOUSE SIGNS
For Accident Prevention

HALF THE VALUE OF ANYTHING TO BE DONE IS DOING IT PROMPTLY
THINK
CARELESS MEN NEVER ARE EFFICIENT
NOTICE
STAY ON JOB UNTIL WHISTLE BLOWS
NOTICE
-NO-
LOAFING ALLOWED
PLEASE TURN OFF LIGHTS
MATERIAL IS MONEY SAVE IT!
IF YOU ARE A SELF STARTER THE BOSS WON'T HAVE TO BE A CRANK
SAFETY FIRST
BE CAREFUL
SAFETY FIRST
HELP KEEP THIS PLACE CLEAN
HELP US MAKE THIS A BANNER YEAR FOR NO ACCIDENTS

for *Efficient* production

TODAY, greater efficiency per worker is one of industry's most urgent production requirements.

Costs and prices are of vital importance in a market where competition becomes more and more keen.

You'll find the use of Stonehouse "Efficiency" signs most helpful in creating greater efficiency and improved employe morale.

STONEHOUSE STEEL SIGNS
For Accident Prevention

STONEHOUSE COMPLETE CALALOG NO. 9...64 pages, in full color, shows hundreds of different stock-worded signs covering every conceivable hazard. It's free on request!

Stonehouse **SIGNS, inc. MANUFACTURERS • Stonehouse Bldg., 9th at Larimer**

"Signs Since 1863" **Denver 4, Colorado**

ACCIDENT PREVENTION • *steel* SIGNS IN STANDARD COLORS AND DESIGNS

Please use a F-18 on prepaid card for further details.

program were centered in formulating basic safety standards for mechanical safeguarding and safety rules; and obviously conditions and hazards in need of the most urgent attention were cared for first.

The Three E's

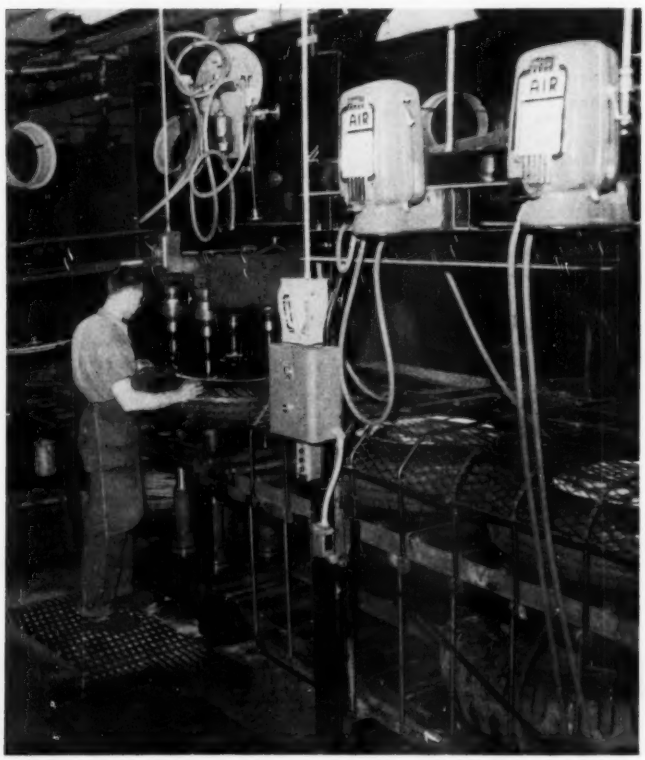
In a measure, our course followed the pattern with which all of us in accident prevention are so well acquainted, namely, the three E's of safety: engineering, education, and enforcement. A chief safety inspector, in cooperation with plant inspectors at the various operations, prepared specific rules to be followed in an attempt to eliminate hazards, and the first rules developed were for the safe operation of elevators and electric cranes. Those safety inspectors held bi-monthly meetings at various operations, inspecting the facilities and the safety practices employed at the plant visited. Thus an opportunity was afforded for holding discussions and for interchange of ideas by all members of the group, as each inspector reported the progress and possible difficulties encountered within his own plant in administering the safety standards already established.

Central Safety Committee

Later, committees at the plants were set up composed of men from the ranks and members of management to make departmental safety inspections, hold departmental meetings for safety, and to form an over-all works safety committee.

In the early 1920's the progress that had been made in the accident-prevention field since the inception of the organized safety movement within the company was recognized by the managers of manufacturing; and to give the movement further impetus a central safety committee was formed, consisting of members of management at the top level. The purpose of this committee was to permit a more detailed study of the safety movement in all its ramification from a company-wide point of view, to further insure that safety would be included in all of management's planning and to establish policies for the promotion of safety, health, and sanitation. Our concept of the problem has always been that the goal desired is not simply to reach some unknown irreducible severity and frequency figures, but to strive for the total elimination of industrial accidents from whatever cause and to assist as far as possible in the elimination of home and highway accidents.

TIRE ASSEMBLY (Before) Manual method of hammering lock rings in place to secure tire to rim assembly. Note possibility of smashed fingers, eye injuries from flying particles, awkward position, effort required to perform the task.



TIRE ASSEMBLY (After) Mechanical method of assembling lock rings to rims eliminates all awkward physical effort and related hazards. Note guards over tire inflation area to protect personnel if a lock ring should fly off.

Caveat Emptor

Safety in the Harvester Company is a matter of cooperation throughout all departments. Every attempt is made to provide safe working conditions in the plants, which include adequate heating, lighting, ventilation, and sanitation facilities. Safe machine tools and equipment can be purchased to meet one's requirements, and toward that end it has been our policy to attach a copy of our standards to each purchase order *(To page 108)*

Figure 1:
Vacuum cup safety tool for presses (1913) was developed from ideas submitted by employee.

Figure 2:
Safety hook for cranes, about 1920, proved so sound an idea that it is still in use today.

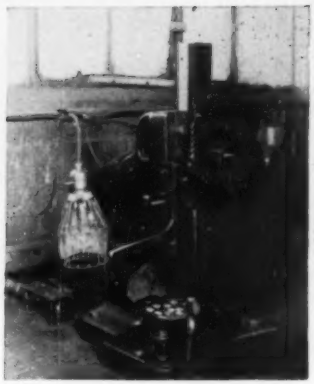


Figure 3:
A 1921 design for two-hand tripping of kick press to prevent hand injuries to operators.

SAFETY - THE FIFTH FREEDOM

Typical of American ideals is the recognition by Westinghouse of the right of the individual to Freedom from Injury —and typical of American ingenuity are the unique ways they have found for achieving that ideal.

By T. O. ARMSTRONG, Director
Plant Labor Relations
Westinghouse Electric Corporation
Pittsburgh, Pennsylvania

FREEDOM from Injury—The Fifth Freedom—has been the aim of every safety man since the inception of safety programs. Man has paid dearly for his careless work habits, and for his having had to work with unsafe machines and tools. Thanks to the persistence of a few forward-looking men—a few stalwarts; yes, almost martyrs—all of that has changed.

Safety Pioneers

From the very beginning of the Westinghouse Electric Corporation a prime concern has been for the safety of the men working in our plants, and for the safety of the users of the company's products. This is perhaps best illustrated by the reply George Westinghouse made to Thomas Edison's charges that alternating current was dangerous. Mr. Westinghouse said: "... were it a question of prohibiting the use not merely of electricity, but of all things dangerous to life, we could no longer have fires to warm us or light to enable us to see, and, in fact, would be deprived of most of the necessities and comforts of existence. As has been the case with all other forms of energy, the demand for the most economical methods will ultimately prevail,* *providing these can be made safe, as they most certainly can, by the exercise of proper precautions.*"

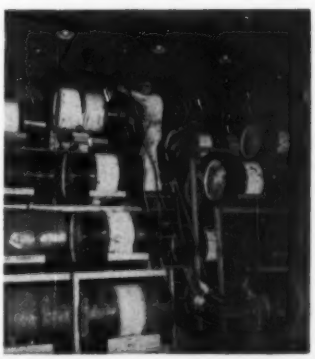


Figure 4. Safety in barrel-handling: racks easily accessible, mechanical hoist, strong ladder.

* Italics added by the writer.

Fig. 5. Transformer production aisle of the 1920's was cluttered, crowded and had power transmission belts from overhead shafts.

Fig. 6. In a Westinghouse transformer production aisle of today, open areas, mechanization and neatness contribute to safety.

From this it can be seen that our belief in, and practice of the Fifth Freedom is one of long standing. With us, good safety practice is a philosophy, a way of life.

One of the earlier pioneers in industrial safety was Carl B. Auel who is representative of the many who, in addition to their prescribed duties, gave of their energy and talent to the well-being of others. As one of the first early safety supervisors and an early President of the National Safety Council, Mr. Auel extended his influence beyond the confines of Westinghouse.

His work in the development and the formation of some of the codes for punch press and other power press guarding and for the guarding of circular saws and shapers is typical of the early stages of safety engineering to protect the worker and make machines safe for operation. Mechanical power transmission codes are also credited to him by many old-timers.

Early in the safety movement, they tried the "scare approach" in the effort to interest people in working safely. The fourth of July Parade of 1922 exhibited the "horrors," such as defective tools, that caused accidents.

Much has been learned since then about the ways of motivating people and much of the present achievement in the field is due first to the desire of the companies to know the facts and to record them, thus making possible the study of accidents, the determination of the cause, whether man or machine, whether carelessness on the part of the worker or a machine or press improperly guarded.

From this humble beginning, accident prevention has evolved over the years into a professional status requiring the skills of all phases of management, including engineering, tool and machine guarding, plant layout, etc., and education—the task of causing people to think and act safely because they desire to be safe.

While early records are not as complete as those of today, the trend of accident frequencies is downward which means dividends not only to the employer in reduced costs, lost time and dissatisfaction, but also freedom from pain, lost time and costs to the worker and his family.

Personal Protective Equipment

Campaigns, drives and promotion are effective tools of the safety man to motivate employees in performing their daily tasks safely, and the fruits of the years of such campaigns and promotion in the fields of eye and foot protection serve as typical examples. Westinghouse was one of the first companies in America to encourage the use of safety shoes, and all of its plants carry a stock of active styles and sizes where employees may purchase them at cost through the payroll deduction plan. The past few years have shown remarkable progress in employee acceptance, due to the development of a full range of shoe sizes and lasts to the extent that the safety shoe of today can no longer *(To page 76)*

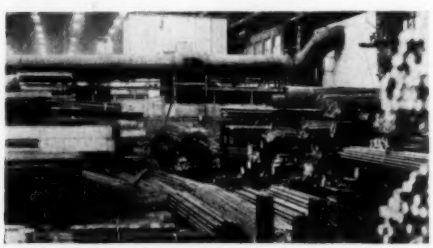


Fig. 7. Before: An unknown number of accidents lurk in this disorganized storage area which was also extremely inefficient.

Fig. 8. After: There were fewer accidents when the stock storage room was rearranged. Handling was also made easier and faster.

Unretouched photographs of modern styling of safety shoe oxfords.

SHOES WITH EYE-APPEAL

The importance of good safety shoe styling to encourage constant use of foot safeguards.

By RAY HARRISON, President
Safety Box Toe Co.
Boston, Massachusetts

IN ANY commentary on the styling of safety footwear—apart from a profound belief in its critical importance—it is necessary to emphasize that style is a secondary consideration to foot safety. A safety shoe first must be of strong, durable construction and made on lasts that provide for sound foot comfort. It must meet the wearer's particular job requirement in respect to upper and outsoling materials. Its concealed safety steel box toe must be properly incorporated into the shoe construction and in position to afford the wearer maximum protection against toe injury. These are basic requirements which shoe styling must not compromise.

However, after compliance with these fundamentals, there appears no reason why safety shoes can not be attractively styled as a means of broadening their acceptability by workmen who might otherwise forfeit all of their safety advantages through outright dislike of shoe appearance. The history of footwear certainly confirms the vanity of man. Although our generation has stripped shoe styling of much nonsense, the wearer's decision to accept or reject a given shoe is still largely made on the basis of its eye appeal, and in this—regardless of its primary utility purpose—safety footwear differs but little from a soft-soled house slipper.

Thousands of years have passed since man fashioned his first foot gear from bark and leaves, tied to his foot with fibre or thongs of animal hide. For centuries he gave no thought to footwear styling since the important primitive function of foot covering was to protect the soles of his feet against the ungentle abrasion of soil, rock and sharp thorny plant life, and his inventiveness was more than sufficiently taxed in meeting this basic qualification alone. However, as soon as his tribes fused into nations, his individuality demanded a distinctive personal costume, and his footwear, after first achieving acceptance as to general shape and comparative durability, became as embellished as his purse and his shoemaker's talents would permit. Medieval footwear, regardless of

origin, extended from complicated upper brocades and rich use of jewels in collared slippers of soft leathers to ponderous "poulaines" having upturned toes twelve inches high, from which dangled pompons and tinkling silver bells. Renaissance shoes were even more extreme, and laws were passed in some countries to control the further distortion of shoe shapes, as by now—in a fast selling novelty known as the "scarpine"—shoes looked like the multi-colored paws of a supernatural animal having toes like grapeshot and covered end to end with rosettes and cluttery furbelows. Fantastic, these men's shoes of history! Yet certainly symbolic of the competitive effort of a shoemaker—or his guild—to make more shoes and prosper thereby from the simple marketing axiom of giving people what they want.

Shoes Become Shoes

Shoes first started to look somewhat as they do today in the 17th century when their rearward portions became elevated and supported by heel members. Yet the styling battle continued to rage, and only in peasant or aboriginal footwear of the period do we find anything that resembles a simple foot covering free of competitive decorative expression. In whatever walk of life, the undistinguished shoe was passed by for the most ornate that could be afforded, apart from either the questionable taste or the practicality of its ornamentation.

In the 19th century the need for producing greater quantities of shoes to meet population growth caused the adoption of simplified and reasonably standardized shoe design. The all-leather blucher shoe —named for the Prussian general who adopted this style of upper in military footwear—became popular about 1885, and through its very simplicity has remained so to this day. Oxford shoes, cut below the ankle and modeled from age-old slipper forms, appeared after the turn of the 20th century and grew rapidly in popularity as men's dress in general became much more simplified. The balmoral—now known as the "bal" style having a closed seam between vamp and quarter—competed against the blucher in both oxfords and brogues for men's fancy, and although the necessity for tailored styling had become mandatory to the production of machine-made shoes, competition within the scope of standardized shoe shapes soon drove shoemakers to the re-employment of style in order to develop consumer preference for their own product. Although the fur rosettes, pompons and tinkling bells were gone and the revitalized upper styling isolated to combinations of materials and colors, the same favor for a given brand or kind was sought—through novel shoe appearance—that the guild bootmaker solicited in the Middle Ages. The new word was "merchandising" and had much to do with "giving them what they wanted," although extended further to awakening the want for it.

Safety Shoe Debut

Let us now consider the newest of all footwear—the safety shoe—and how style relates to it. Back in 1928, the year when the first steel toe was produced in the United States, the pioneer safety shoemaker gave but little thought to shoe styling since a safety shoe was then considered part of an industrial uniform and it need only be comfortable and rugged to meet every requirement. Its only job was to take its beating day after day and to protect the wearer's toes as far as possible in the event of accident. The 1928 steel toe was a Munson type having its high point directly over the big toe and sloping sharply to the outside. It was broad and blunt, though in keeping with toe profiles common to the period in non-safety work types. The two toe styles successively adopted thereafter were Munson modifications which, from the standpoint of finished shoe appearance, differed only slightly from the original.

As demands for improved safety shoe styling increased, consistent with toe shape refinements made in non-safety brogue types and, no doubt, aggravated by the growing popularity of the lighter and trimmer dress oxford shoes, the safety shoemaker experimented with the adaptation of existing steel box toe shapes to oxford shoe styling. The need for toe shape refinement became *(Continued on page 60)*

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From the collection of the Bettmann Archive.

Production of catridges shortly before the Spanish-American War. Note complete disregard of safety in arrangement of machinery and dresses of women workers.

From the collection of the Culver Service.

Japanese officer and soldiers wore protective helmets and coats during civil wars of the thirteenth century.

Pictures from the Past

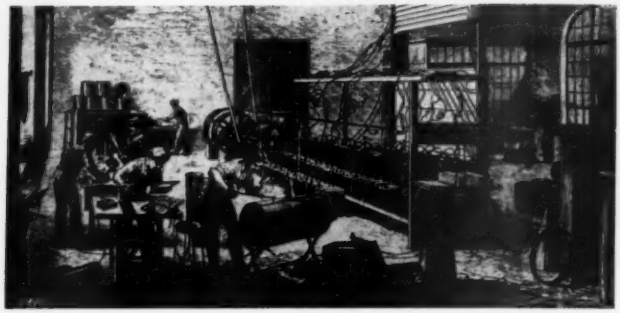
From the collection of the Bettmann Archive.

Bee Keepers at Work, from a wash drawing by Peter Breughel (1529-1569). The bee keepers have equipped themselves with head masks protecting them from the swarming bees—an early application of safety clothing.

From the collection of the Culver Service.

Protective goggles, gloves and coat for grinding operation, and an early type of guard for wheel.

A delivery wagon of 1907.



Welding in 1888 by means of storage batteries. Welders had to hold a glass shield to protect their faces, and there was no provision for removing toxic welding fumes.

MID-CENTURY SAFETY VIEW

The story of steady progress in eye protection during the past fifty years, with a look at how America can continue to maintain safe production in the future.

By THOMAS A. WALSH, Member A.S.M.E., A.S.S.E.
Manager, Safety Engineering Service Bureau
American Optical Company

Through modern, comfortable safety goggles, today's worker looks back at one of the early models (right) with a string across the nose and with wire-mesh eyecups so small they covered only the immediate area of the eye.

IT IS singularly fitting that now, in mid-century, SAFETY MAINTENANCE & PRODUCTION should be celebrating its Fiftieth Anniversary, for the history of this magazine has coincided with the development of safety engineering and through the years has been a guide and incentive to safety engineers.

When the world swung into the twentieth century fifty years ago, it was a forward-looking time. Men could see the rising wave of a whole new century and their minds were stirring with new ideas.

In 1906 Theodore Roosevelt wrote:

"As modern civilization is constantly creating artificial dangers to life, limb and health, it is imperative upon us to provide new safeguards against the perils."

This trumpet call to action against the hazards created by industrialization shows forcefully the awakening interest in the protection of the individual as a vital factor in production. In accepting the challenge posed by industrial accidents, men of foresight recognized the need for a new approach to safety. Some types of guards were already being used successfully on machines, and as a new approach, people were beginning to explore the possibility of putting protective equipment on the operator as well as on the machine.

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This early eyecup goggle, about World War I, saved an eye. Reamer hogged and the handle struck the goggle, but lens remained intact.

and Health Exposition, held in New York in 1907, there were exhibits of safety goggles for granite workers. The goggles were of the spectacle type and had flat glass lenses that were designed not to chip.

The forerunner of the modern eyecup goggle was also available from foreign sources. One model had eyecups made of a wire mesh screen, while another had metal cups with thick flat lenses, which were retained by metal strips bent over the edge of the lens. These early goggles were tentative answers to the problem of eye injury from flying particles and relied chiefly on the thickness of the glass for protection. While effective against small particles striking with little force, the lenses could be shattered by larger particles and the pieces of broken glass then became additional hazards to the eye, owing to their generally large fragmentation. By 1910 the iron and steel industry was becoming interested in eye protection and improvements were made in the construction of the spectacle. The saddle bridge was developed and designers conceived the idea of beveling the edge of the lens to fit into a corresponding bevel in the eyewire, so that a broken lens would be retained more securely within the frame.

One of the earliest plastic faceshields. This crude model was being used in January 1929.

Contrast the plastic faceshield above with vastly improved modern lift-front version.

The Legal Incentive

The passage of the Workmen's Compensation Laws in the second decade of the century not only changed the legal aspects of accident prevention, but also awakened a lively interest in eye protection as well as other types of protective equipment. In a few years, statistics indicated that eye accidents were an important factor in the program of prevention and a factor that could definitely be controlled.

It was evident that eye guarding devices offered the means of control and that reputable manufacturers were making headway in their design and construction. However, inferior types were also appearing and it sometimes became a question of how much the industrial worker could rely on the protector to actually protect.

With the first National Head and Eye Code in 1921, minimum specifications were established for the design of frames, eyecups and lenses and for the impact resistance of the lenses. Thanks to this code, which was revised in 1938, and to the Federal Specifications, the question mark was taken out of the performance of eye protectors.

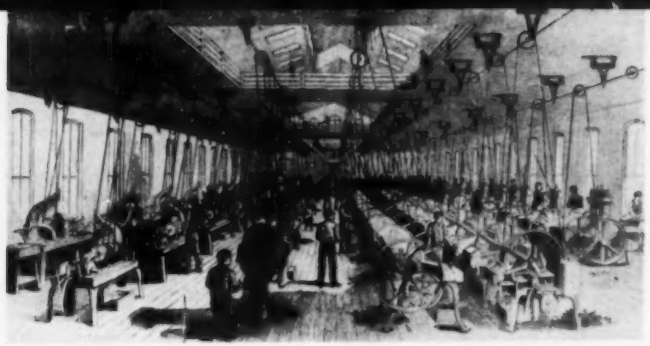
In the early twenties, to increase the impact resistance of the lenses,

Model of an early welding helmet. The metal reflected light into the eyes of other workers.

toughening processes by heat treatment were perfected. With this major advance, manufacturers were able to produce reliable goggles. Since then, they have improved the heat treating process, changed the designs of the frames and eyecups to give maximum protection for specific hazards and combinations of hazards—flying particles, dust, harmful liquids, heat. These changes have increased the factor of safety both in the lens and in the design of the frame or lens retainer and made the devices more comfortable. New materials such as plastics and other molded compounds have been substituted for metal in the frames and eyecups to make the devices more effective for exposures to specific hazards.

Too Much Light

The need for devices to shield the eyes from impact hazards was self-evident. Less obvious perhaps, but equally important was the problem of protection against radiations. Specifically, the development of welding had made some kind of goggle which would filter intense light imperative. Before World War I, protection against gas welding was provided by a colored glass lens, generally with *(To page 114)*



From the collection of the Bettmann Archive.

Could they have had an accident in this 1881 factory? In the past, safety engineers would have looked first at the unguarded belts and machines and at the lack of protective clothing and equipment for the workers. Now it is time that we really look at the men in the picture as separate individuals.

Loss Prevention Philosophy for Today

From the collection of the Bettman Archive.

This 1867 woodcut shows "A frightful accident in a saw mill." The woman was picking up clips in the yard and reached for something through the belt of the saw mill. Her dress became entangled in the belt and she was carried over the shaft some thirty times before the machinery could be stopped. From the modern standpoint, the belt should have been guarded, but we should also ask what caused the victim to be so totally unmindful of the impending danger.

By ROBERT CLAIR
Assistant Vice President
Liberty Mutual Insurance Co.

WHEN our Company was founded by a group of Massachusetts insurance buyers in 1912, they had the vision of both an *ideal* and an *idea*. Their *ideal* was that this new insurance company should be more than a common fund for the payment of loss, and from this came the *idea* that accidental loss—and the suffering that accompanies it—must be prevented. The records will show that this ideal and this idea have been carried out and expanded as our operating philosophy down through the intervening years. We believe that Loss Prevention is the major contribution that a casualty insurance company can make to its policyholders' employees—the men and the women who work in industrial and business establishments.

As we all know, the prevention of accidents has become a complicated profession for many reasons. The rapid diversification of goods produced has brought a multitude of new materials, processes, and methods. The many types of industrial and commercial occupations present a wide variety of hazards. Even within the same industry, individual establishments present different problems that must be solved by different procedures, and some will do more than others.

The Age of Specialists

This has resulted in a highly desirable specialization. For instance,

(Continued on page 95)

Industrial safety and hygiene must now concentrate their efforts in preventing remote-control accidents: ones in which off-the-job conditions cause on-the-job injuries.

YESTERDAY AND TODAY
In fighting fire by water spray.
Figure 1., left, 55-year-old patent for one of the earliest water spray nozzles.
Note "Demon Fire" sketch in center of flames.
Figure 2., right, advances in nozzle design permit firemen to attack electrical fire with modern equipment.

Steps in the development of the modern fire extinguishers.

THE past half-century has seen more progress in science and engineering than all the rest of recorded history. Human life has been enriched by the introduction of the auto, the airplane, radio, television, etc. This progress has been accompanied by the use of a wide variety of new materials, many of them quite hazardous, in ever-increasing amounts. During this period the problem of the fire protection engineer has been:

(1) To keep abreast of the increased use of hazardous materials.

(2) To help develop fire fighting equipment to keep these increased hazards from getting out of control.

1900–1910

At the turn of the century our industry was still more or less in its infancy. The problem of extinguishing fires in paint dip tanks had not yet become serious and the only generally accepted method was to have on hand a mixture of sawdust and sodium bicarbonate. This mixture was kept in bins or other containers and in case of fire it was applied with a scoop or shovel.

The use of sodium bicarbonate as a fire extinguishing agent is reported in published fire protection literature following the Iroquois Theater fire in 1903. A stage hand is reported to have attempted to use a tube of sodium bicarbonate and to have failed to control the fire, with resulting loss of life.

From the collection of the Bettmann Archive.

A fire patrol barrel used at the Louisiana Cotton Centennial Exposition, about 1884.

During this same period attempts were made to produce carbon dioxide extinguishers. However, the proper means of application were not developed until much later. It is interesting to note that consideration was also given to the use of sulphur dioxide as an extinguishing agent. The toxicity of this material soon ruled out its use.

1910–1920

Early in this decade a letter was written to the Factory Mutual Laboratories by the fire chief of the General Electric plant at Schenectady describing fire tests on transil oil with water spray nozzles and with the carbon dioxide extinguishers available at that time. Good results were reported to have been obtained with the water spray, but the results with the carbon dioxide were poor because of the nozzles then available.

While this is one of the earliest reports of actual tests of a spray nozzle, it can be seen in Figure 1, that the use of water spray nozzles

1901 - 1951. . . . . .

on fires had been considered at a much earlier date.

The first successful carbon dioxide extinguishers were produced at about the middle of this decade, but they were not suitable for use on flammable liquid fires. They were used by the Bell Telephone Company of Pennsylvania in its telephone exchanges. They used conventional steel cylinders with valves provided with hoses and nozzles from soda-acid extinguishers. This crude extinguisher was quite effective despite its tendency to freeze and clog, and despite the fact that the nozzle entrained more air than the amount of carbon dioxide discharged. These extinguishers remained in use in Pennsylvania for about ten years.

At about this same time a carbon dioxide system was developed for extinguishing fires in the holds of vessels. The first such system employed commercial cylinders of carbon dioxide with heating devices which had to be heated up before the cylinders could be exhausted. These flooding systems were more successful than the first hand carbon dioxide extinguishers because they did not present the same problems of nozzle design.

The first use of foam on flammable liquid fires was reported early in this period with glue being used as the foam agent. The use of foam developed rapidly and both foam hand extinguishers and stationary foam units were listed by Underwriters' Laboratories, Inc., during this decade.

Another new type of extinguisher was also introduced during this period. It was the first gas-pressure dry chemical extinguisher (See Figure 4). This model was produced in Germany and introduced in this country shortly after World War I.

One more fire extinguishing agent was recognized during this period. The vaporizing liquid extinguisher was listed by Underwriters' Laboratories in 1912.

1920–1930

In this decade the use of carbon dioxide was greatly extended, partly through the development of shielded nozzles to limit the amount of air or other gases entrained by the carbon dioxide at the point of discharge. The performance of these extinguishers was greatly improved so that it was possible to use them effectively on flammable liquid fires.

A further development during this period was the automatically operated fixed carbon dioxide system for the protection of special hazards.

An interesting patent was issued early in this decade for a fire extinguishing material. In the words of the inventor it consisted of "A granular or sub-divided material capable, like cork, of floating on the surface of the liquid and rendered non-combustible in any desired way." The results apparently were expected to be much like those from the use of the mixture of sawdust and sodium bicarbonate.

This decade saw the first real improvement in the dry chemical extinguisher since it was introduced from Germany. New models were brought out which included a hose and nozzle permitting control of the discharge.

Toward the end of this ten year period, the first tests were made of a large fixed vaporizing liquid system on flammable liquid fires, but relatively few such installations were ever commercially made.

1930–1940

Carbon dioxide extinguishers were coming into considerable use

Figure 3. German "Minimax" extinguisher introduced in U. S. about 1912. A number of these unique extinguishers are still in use today.

Figure 4. Earliest pressurized dry chemical extinguisher was this German "Total" . . . introduced in the U. S. shortly after World War I.

although the discharge time and range were still rather limited.

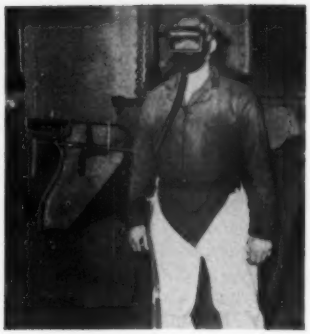
It was during this period that the value of water spray nozzles for combating fires in flammable liquids was recognized. The extinguishing action was said to be due to the formation of a temporary

(Continued on page 81)

By DAVID C. TIMBERLAKE
Fire Protection Engineer
Ansul Chemical Co.

. . . WEAPONS AGAINST FIRE

Underneath his "Man from Mars" protective covering (picture at left), this grit-blaster wears a special respirator (picture at right) to provide him with an independent supply of clean air. His work is isolated in a separate room to safeguard the other workers.



By J. T. WILLIAMS
Manager of Safety
The Pennsylvania Railroad

PENNSYLVANIA R. R. SCHEDULES PROTECTION

How The Pennsylvania Railroad has saved the lives of 3700 employees and prevented over half a million serious injuries.

"SAFETY is of the FIRST importance in the discharge of duty"; so reads *Genesis I:1* of the railroadman's bible, the Book of Rules. Go back a hundred years to the 1851 edition of The Pennsylvania Railroad Book of Rules and a reference to safety appears in the opening sentence. Safety of operation has always been the prime consideration, the number one order of business, in the operation of a railroad. And when it is realized that the basic problems in employee safety and in safety of operation are, in many respects, identical, and that in safeguarding employees, the public safety is largely secured, it is little wonder then that The Pennsylvaia Railroad, which pioneered in the development of mechanical safeguards and in safe practices of operation, would also pioneer in employee safety.

Its role in the development of the steel rail, stronger roadbed, automatic couplers, all-steel cars, block signal operation, automatic signals, train telephones, cab signals, and train speed control, is evidence of The Pennsylvania's pioneering spirit.

While, as in industry, there was a considerable amount of employee safety work during the later days of the last century, The Pennsyl-

No exceptions to the goggle rule here. In this, and two adjoining shops, 12,000 workmen leave their goggles on throughout the day.

Prompt investigation of accidents is important part of the safety program in the repair and maintenance shops of The Pennsylvania.

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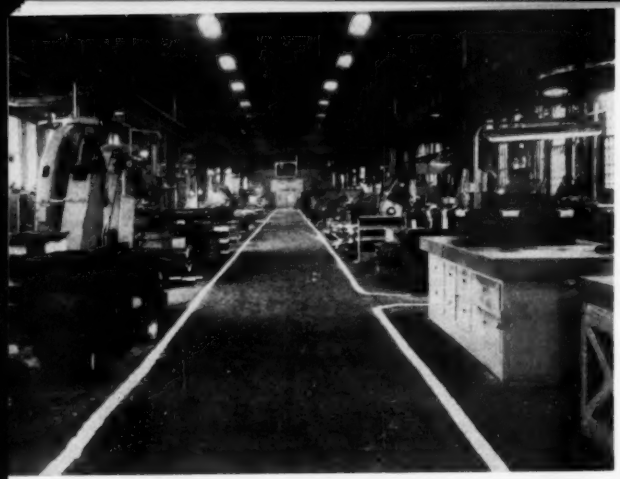


Clearly marked, well lighted aisleways are safe shop "highways."

vania Railroad early joined its partners in industry to help give impetus to organized safety work as we know it today. It is interesting to note that some of the "schemes" which are considered modern ideas today were in practice on The Pennsylvania at the start of the safety movement.

As early as 1910 every one of the 35 divisions on the railroad had safety committees of employees from the ranks; and by 1914 they had made 20,000 recommendations, of which 16,000 were adopted by the management. In 1912 over a million surprise safety tests were made to check employee obedience to rules. In 1913 Safety First lapel buttons were used as constant reminders to work safely. In that same year the employees staged an effective and dramatic Safety Exposition in New York City. Scheduled for a one-day stand, it aroused so much interest that it was held over for a full week. Today the "Signs of Life" program is working for safety on the highway; but back in 1913, The Pennsylvania Railroad encouraged school teachers to talk to their children on the dangers of trespassing.

The planning was sound from the very start of the safety movement. It was based on a real appreciation of the benefits to be derived from safeguarding the well-being of employees as well as the general public. The basic plan has withstood the test of four decades of application. Only the techniques have changed to cope with new and more complex problems. Higher speed operation, more extensive use of machines, a greater volume of business, and more vital national defense interests have increased the importance of the problem; but the primary aim of developing in each employee a sense of personal responsibility for safety and a knowledge of how to meet that responsibility has remained.

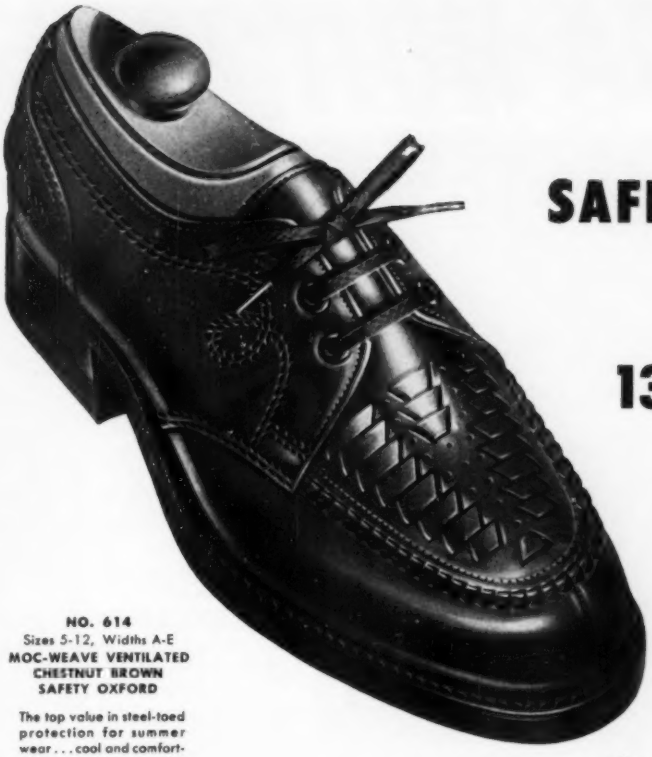
A Human-Relations Job

When you think of employee safety on The Pennsylvania Railroad, you must think in terms of 280,000,000 manhours of service a year being performed by 125,000 workers. To keep this army of workers safe and healthy is a human relations job of monumental proportions: one that certainly requires sound planning in its formative stages and one which still demands the ingenuity, industry, and vigilance of all supervision and management and the earnest cooperation of employees.

The program for promoting employee safety is centered around five major points: (1) mandatory compliance; (2) standardization of safety equipment and safe practices; (3) administration of the program by top operating officials; (4) comparative method of performance appraisal; and (5) utilization of employee talents.

Effective cooperation with the safety program is a prerequisite of promotion, and compliance with the rules is a requirement for continued employment. In a system that makes officers personally answerable to their superiors for the safety performance of their departments, no subordinate who is either unwilling or unable to pursue effectively the safety program for which his superior is responsible will be considered for promotion. Refusal on the part of any employee to obey the safety rules is considered grounds for dismissal; and while such action is a means of last resort, after all reasonable attempts to reconcile an uncooperative employee have *(To page 84)*

Respirators get weekly "treatment" in the sterilizer room to maintain sanitary standards.



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. . . . BUT WE ARE

1817 Iron Age 1951

The Safety Shoe for Industrial America

Our company pre-dates the establishment of this magazine by 84 years . . . for we were founded in 1817. Then as now the primary interests of the company were directed to supplying shoes of good value to working people. Our Iron Age safety shoe division was formed with the objective of furnishing American industry with better quality and better service in protective footwear. We have never lost sight of this objective. Our position as a leader in the safety shoe field has been reached through keeping abreast and even ahead of ever-changing requirements. Remember, if it's a popular new shoe style and can be made with a steel toe, you will find it first in the Iron Age line. Write for new catalog.

Iron Age DIVISION
H. CHILDS & CO. INC.
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Iron Age SAFETY SHOES

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The Day After is Safer Than The Day Before

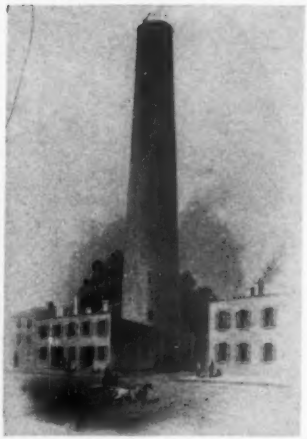
From its earliest days, Du Pont has been acutely aware of the hazards of its operations to personnel, and has kept pace with all the advances made in accident prevention.

By J. S. QUEENER, Manager
Safety & Fire Protection Division
E. I. Du Pont de Nemours & Co.

THE intense concentration on safety in all operations of the Du Pont Company today is neither new nor an afterthought. It was built into the organization 149 years ago by E. I. Du Pont de Nemours, the founder, and has been of paramount importance in management's thinking and planning ever since.

Attention to safety was somewhat unusual in those infant days of the American powder industry, when the very survival of any company was at stake because of the tendency of plants to vanish suddenly in enormous sheets of flame and clouds of smoke. This is, fortunately, not the case today, when both the economic and sociological importance of safe operation are widely and generally recognized.

The company's founder inherited from his father a very strong sense of responsibility to his neighbors in the community, to the men and women who worked for him, and to the stockholders who backed his venture. Maximum safety of life and property was a primary consideration in building his mills on the Brandywine.



From the collection of the Bettmann Archive. The shot tower of an early munitions factory.

The "Funeral of Old Man Accident" featured the safety campaign in one plant in the early days.

The markedly realistic French had established a custom in the powder industry that tended to make management safety conscious. It was that plant management and their families should live on the plant grounds. This custom the Du Ponts followed, and their example did much for morale in the plant.

As for the buildings themselves, the founder built them with three strong walls, a weak front and roof, so the destructive force of any possible blast would exhaust its greatest damaging power toward

Old Man Accident's "bier" and "pall bearers"

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the creek and away from other buildings. Ever since his day it has been one of the company's best observed principles to build security from accident into Du Pont plants by making safety problems essential factors at the design stage.

The founder, even in the early days of the industry, voiced a precept now fundamental to modern safety, but new in his time, that safety is a personal responsibility of workers, too, and that safety consciousness is an essential factor in preventing accidents. Following the first explosion that killed anyone in the family of Du Pont workers in 1815, he declared:

"No one can ever enter the mills again until his clothes are inspected. This examination will cause them all (employees) to be very much alert. The day after an accident is always safer than the day before."

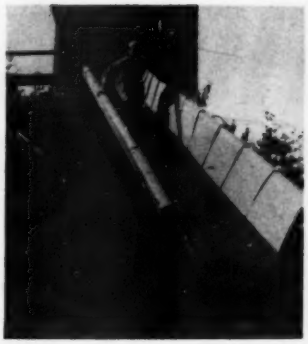
In this blast, nine men met death in the mills and the founder gave

For added safety, explosive workers' coveralls are made with cloth-covered or rubber buttons to prevent sparks from metal-to-metal contact.

further expression to his sense of responsibility by looking after the welfare of the families of survivors, roughly a century before workmen's compensation became a recognized procedure in American industry.

Taking the Lead

One of the earliest safeguards followed by Du Pont was that no worker might start making powder in a new or rebuilt mill until an executive, most frequently a member of the family in those days, first operated the machinery and turned out, by himself, a batch of powder. Safety was a responsibility of management and so captains of the industry assumed the risk of determining that a new operation was in working order before an employee was permitted to work.



Explosives plant has emergency escape chutes down which the workers can slide standing up.

Limits on the number of workers permitted in each building are strictly enforced for safety.

Throughout the 19th century, physical safeguards, more and more, were devised to help prevent accidents. Black powder for the *U. S. S. Constitution* was shipped part way from Wilmington to Brooklyn, N. Y., on cars that were shoved instead of pulled, by a locomotive, so sparks from its stack would not imperil the cargo. In 1883, magnets were installed in grinding operations to snare stray bits of iron which might strike sparks and cause an explosion. Spike-footed ladders, cage guards for moving machinery, handrails, and protective clothing became part of the safety paraphernalia; emergency water tubs, and other devices were employed for greater safety; and in 1904 carrying matches into plants was forbidden.

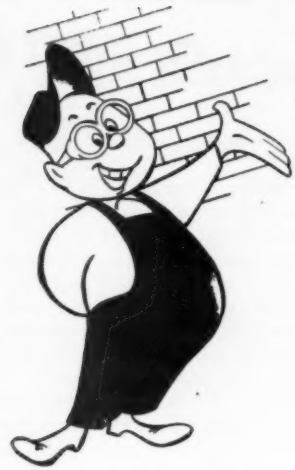
Safety moved toward becoming an organized activity in 1911 when, for the first time, management set up commissions for studying causes and executing plans to avert accidents. As manufacturing activity steadily increased the frequency of accidents increased. Employees began to be enlisted to play an active part in a safety program.

From 1915 to 1919, new programs were formulated and tried out. Definite systems were set up for tabulating injuries as to nature and seriousness, and as to the most prevalent causes and conditions attendant upon them. Methods and standards for safe operation were established and given general circulation in a series of four booklets. By 1919, safety and fire protection had been established as separate service sections each headed by a manager under the direction of the company's technical division.

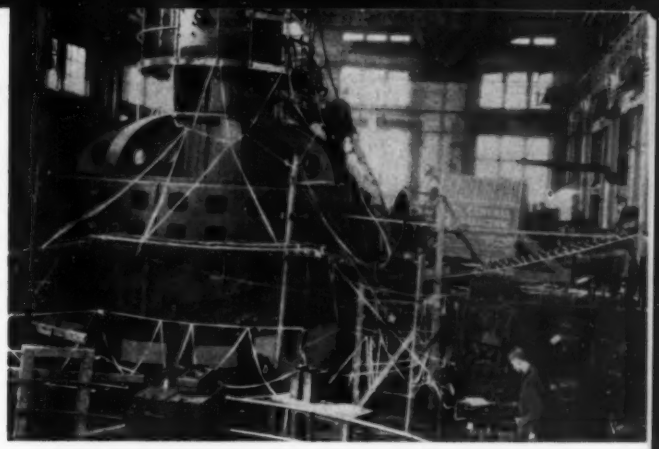
It was in 1923 that efforts to take advantage of competitive spirit among employees launched the first interplant contest aimed to arouse and sustain the interest of men and women in safety. From this contest the company's present "Awards for No-Accident Records" was developed.

Several plants and departments in 1923 began to *(To page 116)*

A maintenance worker is shown donning special protective clothing before undertaking repair.



Safety Sam, who speaks for General Electric's safety program in film, "The Voice of Safety."



Preparing to test a large generator twenty-five years ago. Engineers are shown erecting barriers of white tape to prevent access to the machine during the electrical test period.

General Electric's VOICE OF SAFETY

The General Electric Company not only voices the opinion that accidents can be prevented, it believes and has proved it.

By L. R. BOULWARE,
Vice President
Employee Relations
General Electric Company

"AMONG the human considerations we have all resolved to advance, none is more important than the safety of our employees."

Thus wrote Charles E. Wilson, Director of Defense Mobilization, who was at that time president of the General Electric Company, in a letter of congratulation to the general manager of the Nucleonics Department at Hanford, Washington, last year. It had just been announced that the great atomic energy plant at Hanford had established a new standard for accident-free operation during the preceding year—less than one lost-time accident to employees per million man hours worked.

This individual record has since been halved, and throughout General Electric the accident frequency rate for 1950 was less than four lost-time accidents per million man hours worked—approximately one-third of the frequency rate for industry as a whole.

A welder at work about 45 years ago in a G.E. shop. Note forerunner of welder's helmet.

How is it possible for a company as vast as General Electric, with over 100 plants located from coast to coast, employing over 200,000 men and women in nearly every type of industrial activity, to attain such a record? The statistics are a direct result of vigorous and continuing accident prevention activity over a period of 40 years—a program in which today employees and management work together as a cooperating team.

Safety Comes First

As far back as 1911, the spirit of our safety interest and program

Here employee buys a pair of safety shoes in a typical General Electric Co. employee store.

was reflected in a letter of a plant manager to manufacturing engineers and foremen which stated: "Be kind enough to caution all men operating cranes and hoisting apparatus to be guided by the principle that the volume of business done by them is secondary to the safety of fellow employees."

This philosophy of the importance of the safety of the individual has been restated and reemphasized many times since the first company-wide General Safety Committee was formally organized in 1911. The initial committee was made up of safety representatives from each of the General Electric plants of that time.

At first, it concentrated its attention primarily on the engineering aspects of safety. Periodic inspections of work areas were scheduled. Accident records were reviewed. Machine and factory hazards were studied. Guards and protective devices were created, tried, improved, and installed. Goggles, respirators, and other personal equipment were issued to employees. Many of the accident prevention practices and procedures which were begun then are still standard routines today.

Although when the Committee was first formed its functions were regarded as almost entirely concerned with the mechanical and technical aspects of safety, by 1912 the need for safety instruction for employees was discussed. Even at this early point management was becoming aware that the human factor in accident prevention could not be overlooked.

Although periodic attempts were made to sift safety information down through the channels to the worker at the machine, these experimental techniques were not actually organized into the Committee's regular routine activities until 1925. In that year, it was agreed to use departmental and shop meetings in order to reach all employees with information on safe work practices. From that day until this, ever increasing emphasis has been centered on the employee's part in the prevention of accidents and resulting injuries.

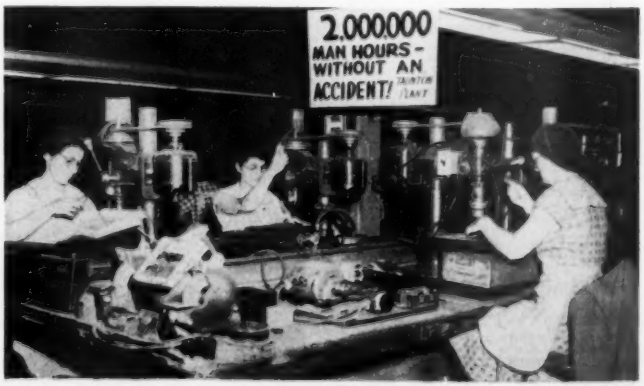
On-the-spot first-aid service was an early innovation in G.E. plants. The company was actively associated with manufacturing and medical groups in studying and establishing some of the first basic standards for factory hospitals and dispensaries. Today, modern, well-equipped medical facilities with highly-trained professional staffs are standard features of all General Electric plants.

Taming Electricity

Since the company was, and still is, primarily a manufacturer of all kinds of equipment for the generation and distribution of electrical power, early attention was given to the special problems and hazards associated with high voltage electricity, particularly in connection with the testing of equipment. A special committee, then named the Interworks Testing Division Safety Committee, was formed in 1925 to specialize in safeguarding against electrical hazards and to promote uniform and safe testing methods and equipment in the company's plants and laboratories.

Staffed with specialists, this group continues to be active as the Testing Safety Committee. As a result of its continuing work, the early hazards associated with testing have been very greatly reduced over the years, and testing jobs are now among the safest in G.E. plants. The knowledge gained has become of substantial aid to the safety efforts of others beyond our plants.

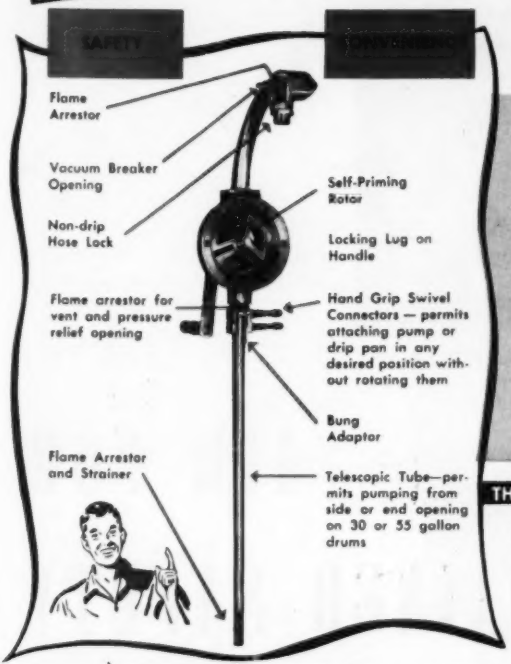
In 1928 the General Safety Committee first issued a general safety rules book for distribution to all employees. This was the forerunner of the present booklet, "Safety Is Part of Your Job," *(To page 79)*



At left, the Bloomer Girl of World War I. The protective cap was already a feature of the standard garb for women at work on machines at G.E. Above: many women contribute to today's production.

NEW Protectoseal FIRE PROTECTIVE TRANSFER PUMP

LISTED BY UNDERWRITERS LABORATORIES — PATENT APPLIED FOR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Flame Arrestor
Vacuum Breaker Opening
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Flame arrestor for vent and pressure relief opening
Flame Arrestor and Strainer
Self-Priming Rotor
Locking Lug on Handle
Hand Grip Swivel Connectors — permits attaching pump or drip pan in any desired position without rotating them
Bung Adaptor
Telescopic Tube—permits pumping from side or end opening on 30 or 55 gallon drums

A pump designed for safety from the bottom of the suction tube to the tip of the discharge nozzle. Flame arrestors at all points necessary to prevent explosion of vapors inside of the drum. Pressure and vacuum relief thru protected openings.

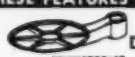
A self-priming pump with a practical pumping speed — 5 gallons per minute. Fast enough for filling small containers — slow enough to prevent sudden overflows.

Easily attached by turning hand grip swivel connectors. Tightens in any desired position without rotating pump.

No. 4500—Pump Assembly. Includes pump, spout with threaded hose connection, bung adaptor, telescoping suction tube with inlet strainer and flame arrestor.

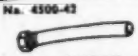
THESE FEATURES OPTIONAL

SIX-FOOT HOSE No. 4500-45
Requires use of vacuum breaker shown below.



DRIP RETURN PAN
No. 4500-42

VACUUM BREAKER & OVERFLOW CUP
No. 4500-40



No. 4500-37 SHORT NOZZLE

No. 506

No. 531

Protectoseal Automatic Flame Arrester Faucets

Use Protectoseal fire-safe faucets when drawing flammable liquids from drums. Flame arrester inside spout guards against flash backs. Self-closing handle prevents leaving faucet open. Valve seat located away from wrench-bearing surface to prevent distortion and leakage when installing.

New swivel type faucet (Cat. No. 506) screwed into drum like any ordinary faucet; then the outlet end easily pivoted to drain position.

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Make safety containers for cleaning and paint stripping operations out of your 5-gal. used pails. Fire in or around pail automatically drops fusible link cover to snuff out blaze.

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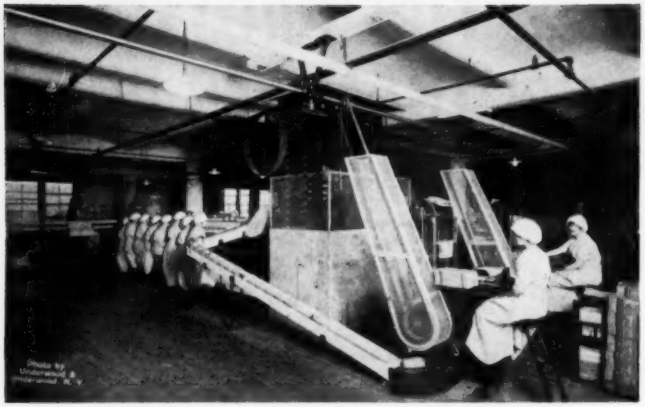

A photo from the past, showing carton-forming equipment and conveyor lines—guarded for safety.

By H. T. EGGERT
Vice-President & Director of Personnel Relations
National Biscuit Company

AIM FOR SUSTAINED SAFETY

NABISCO is setting up an accident prevention program that avoids the pitfalls of "quickie" safety campaigns and makes safety an integral part of the workers' lives.

TO PRESENT the historical and present-day approach of our company to industrial safety would be to present a chronology of events that, in all probability, is a counterpart of accident prevention activities throughout the major portion of industry in our country.

During the fifty-three years of its existence, NABISCO has spread its operations throughout the entire United States, with manufacturing units in dozens of major cities as well as in Canada, England and South America.

Just as our company has followed a program of modernizing and expanding its production facilities so has it implemented its safety program.

During our period of growth since 1898, we felt we had a sound, workable plan of minimizing the total of injuries resulting from accidents. We believe we were among the "enlightened" of those who sought, through every reasonable means, to safeguard employees in their working environment. Particularly since 1929 our entire organization joined its forces in an endeavor to establish firmly an extended program of sound accident prevention measures. Our engineering staff incorporated safeguards not only on equipment that our company made, but also added safety features to the far greater volume of equipment purchased from outside manufacturers. Each month, comprehensive bulletins were sent to all of our widespread locations outlining the progress of the safety program, listing the types of injuries that occurred and recommending measures to be taken so that such injuries would not be repeated. With the full cooperation of other departments, it was possible to emphasize the need for conducting regular safety meetings, making periodic inspections and maintaining safe, sanitary and healthful workplaces.

For many years NABISCO derived a good deal of moral and economic satisfaction from just such a program, augmented with the usual fringes of occasional "pep-up" campaigns, contests and other recognized patterns of accident prevention.

Safety Lends a Hand

However, the war years of 1942 and 1943 proved many things. First, it was realized that a safety program geared to normal employment conditions could not function adequately under the burdens of a

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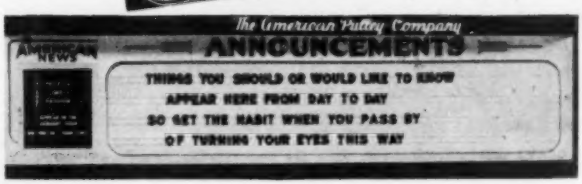
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APPEAR HERE FROM DAY TO DAY
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tremendously increased labor turnover, material and labor shortages, increased working hours and all the other ills that industry is heir to under war conditions. Actually we were faced, as most industries were, with the problem of providing more man-power to offset an acute shortage of man-power. In other words, it was necessary not only to increase the safety staff but to take some *additional* part of the time of *every employee* and devote it to the job of greater safety.

From this new beginning in 1943, and up to the present time, NABISCO has been developing an operational plan of safety that we believe has now reached the point where its most effective potentials will be realized.

From the start, it was acknowledged that many safety meetings and inspections had begun to fall by the wayside in the rush of production difficulties in the early war years. Therefore, our company selected experienced personnel from within our own ranks, who had a thorough knowledge of safety principles, and sent them out into the field to investigate the problem. Moreover, they were charged with the responsibility of selling to management and supervision the need for constructive safety *action*. These men went into the field well armed with the assurance that the executive head of each department in our company not only wholeheartedly endorsed the safety effort but intended to take an active part in it to see that it worked.

Get a True Picture

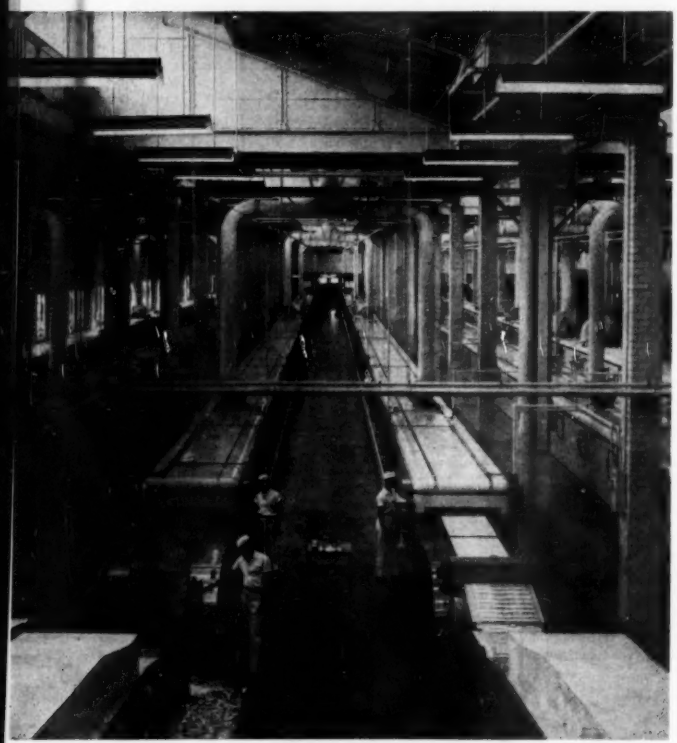
The facts that were learned as a result of the personal investigations made by these safety representatives were largely responsible for the pattern that has been set since that time in furthering the safety program. The facts were that some of the plants had excellent safety records because they had continued to maintain a high level of safety activity, but others had excellent records through sheer luck and were not the least concerned about the very great probability that their luck would run out. Other plants, with comparatively poor records, were giving energetic lip-service to safety but neglecting meetings, inspections, guarding, and training of employees; and there were plants that had every reason to expect successful results but were confused and discouraged because accidents continued to happen.

Our company learned that only personal interviews and personal investigations of conditions could satisfactorily disclose the real core of the problem.

From that point on, the program began to roll. The first step was to organize safety meetings and inspections on a "must" basis, with reports submitted to our General Office listing the specific *action* taken on the recommendations made by the members of the safety committees. All departmental line organizations put their full weight behind the establishment of this and all other elements of the program.

An illustrated booklet was issued to all employees, with short, to-the-point instructive material, covering the most common hazards in our industry and providing the basic principles which must be followed for their protection against injury.

The safety staff recognized the fact that far too often supervision found it difficult to know just what steps should be taken to prevent recurrences of certain types of injuries. Under the new system of accident reporting, specific information is provided to each foreman as to the action that must be taken when a particular type of accident occurs. Furthermore, *(To page 109)*



TODAY'S baking ovens in one of NABISCO'S many bakeries. A clean, comfortable, well lighted place in which to work with SAFETY.

From the collection of Culver Service.

Stumbling ground—the rough, poorly maintained floor of a 1910 shop.

FLOOR MAINTENANCE *Grows Up*

Some suggestions for preventing those costly slip-flops—costly in injury, costly in higher insurance rates, costly in liability claims, costly in lost time.

NOT one, but a number of contributing factors were responsible for the notable advance in scientific floor care over the past thirty years. The acuteness of the problem was pointed up during a succession of national expansion periods. So crucial was the need for cutting down accidents, preventing excessive wear, and improving the physical appearance of floors, that intensive research was instituted almost a generation ago —research which has gone far in solving this problem on every count.

These were the basic elements of the problem:

Appearance. It would be absurd to wear a stylish new suit and tie over an unclean shirt. In the same way modern fixtures and equipment lose their physical attractiveness when viewed atop shabby, ill-kept floors. In business, many people *do* judge a book by its cover.

Accidents. With the desire for improved appearance came a mad scramble for the slickest, shiniest floors in existence. The use of super-high gloss waxes inevitably led to an upward curve in the accident rate.

Slip-flops are not funny to the victim. Particularly when they result in sprained ankles and broken bones. Nor are they humorous to management confronted with liability suits and lost man-hours.

Production. Psychologists and efficiency experts testify that unpleasant surroundings tend to de-

By E. WILLARD MERRITT
Field Supervisor of Safety
Walter G. Legge Company

crease an employee's work capacity. In addition, there are losses of time accruing from slip-accidents.

Economy. Work-time lost is money lost. A high accident rate means a skyrocketing insurance rate. Severe injuries lead to expensive liability suits. And, further, improperly maintained floors erode rapidly, require replacement far sooner than necessary under intelligent maintenance. All these factors lead to vast expenditures rarely foreseen by management.

Tackling the matter from a purely practical standpoint, floors must be considered as vital items of industrial equipment.

Company trucks receive frequent greasings and changes of oil. Motors are tuned and faulty spark plugs replaced. Brakes are periodically adjusted and, when worn, relined. Factory machines are carefully lubricated and cleaned. They are investigated thoroughly for safety.

Why, then, should floors, which are the *base* of every building and every business, not be treated with like care? They, too, perform essential functions.

It is difficult to fix the blame on individuals for the malpractices in floor care which occurred years ago and, in numerous cases, still occur. Most maintenance men are conscientious about their duties. Management, with its many other problems, can scarcely be held accountable. Properly, the onus belongs on faulty education on the subject.

Take the case of Company A. Heavy traffic brought in mud, spilled water, and ground dirt and grime into the floors daily. The maintenance superintendent selected the harshest of cleaners solely on its ability to eat off the dirt.

It seemed plausible enough until the cleaning crews began coming down with skin infections. This resulted in lost time as well as the expense of medical care. At the same time the floors began to show signs of irreparable damage.

Some superintendents were, in the vernacular of the trade, "push-overs" for every silver-tongued salesman who came along. Naturally, this led to over-storing and, in many cases, duplication. Containers lay around in supply rooms so long their labels fell off. Throwing the materials away meant a total loss on an investment. Yet this would have proven far less costly than mistakenly using an unlabeled material on the wrong type of floor.

Know Your Floors

Of primary importance in the training of maintenance crews is the need to educate them in the use of the proper product for the proper type flooring. In some cases a floor may be quickly ruined. In others, the labor involved is utterly wasteful. In polishing, for example, crews should be taught never to use spirit-base products on rubber or asphalt tile floors, since these materials cause the surfaces to dissolve.

Returning to accidents, a study of the files of the Walter G. Legge Company uncovers this startling set of statistics:

Under a haphazard form of maintenance, a large office building had 11 slip and fall accidents on its floors in 6 months. In 3 years, after an intelligent system was installed, *not one* accident occurred.

In a well known hospital, 283 employees slipped and fell within a period of 40 months. Once the proper system was introduced, such accidents *stopped completely*.

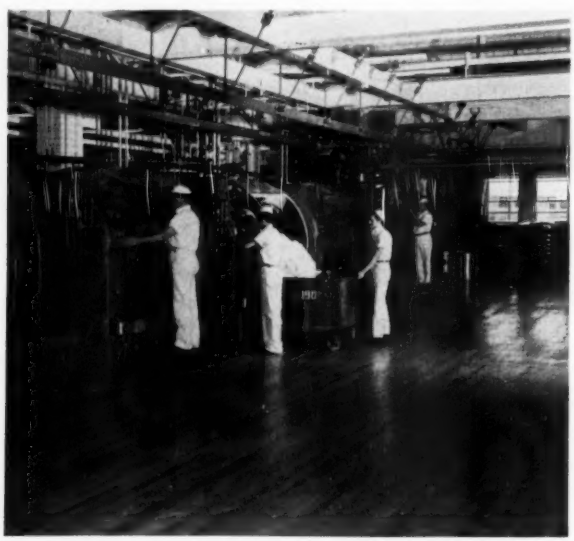
Liability claims by shoppers against a department store because of floor spills averaged 104 a year. Competent maintenance reduced both falls and claims to *zero*.

These are just a few examples, culled from a stack of reports.

Why Do People Fall?

Let's examine the reasons behind falls. As a person walks, the momentum of the weight of his body forces his advancing leg down and forward. At the same time, the leg to the rear is being shoved down and back.

Two factors prevent him from either losing his balance or doing a "split." The first is his brain which controls the muscles of his legs.



Picture by courtesy of the National Biscuit Co.

Floors can be clean, attractive and slip-resistant through good maintenance, as shown in this mixer room of NABISCO'S Houston Bakery.

The second is friction. Friction offers a counter-resistance—tries, in fact, to keep the legs from moving at all. But friction exerts no stronger a force than the slip-resistance of the walking surface.

On a slippery floor, the influence of friction is minimized. Loss of balance happens so swiftly that the brain has insufficient time to transmit danger signals to the muscles. Result? A steady procession of slips and falls, sometimes severe enough to cause fractures and even permanent disabilities.

It is worth noting here that Underwriters' Laboratories, before approving a polish as "slip-resistant," requires that it permit a safe walking zone of 5 units per step. There are polishes available that increase this area to 7.5 units.

One wholly unsatisfactory safeguard against such slips is holding the forward movement to a snail's pace. This means taking small, mincing steps of not more than 2 to 3 units at a time. But such a practice would be ridiculous in a busy office building, hospital, school or factory. Not only would it create an atmosphere of creeping paralysis among personnel, but the unnatural gait would cause body fatigue, thus lowering efficiency.

While high gloss waxes are a major cause of falls, they are by no means the only ones. Sometimes polishes and cleaners which may be quite safe when properly applied are used incorrectly or on floors for which they were not designed. Such an error might intensify slipperiness.

Heavy accumulations of dust and loose litter also cause floors to be slippery.

Some accidents take place during cleaning or polishing, while floors are wet, because a careless workman has neglected to put up a sign or otherwise inform personnel.

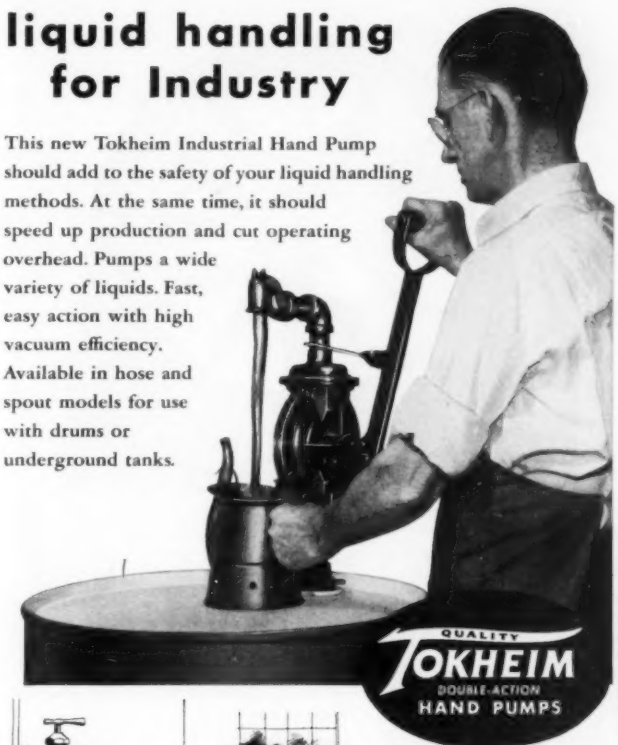
Many falls result from tripping, as well as slipping: mops extending into walkway areas while not in use; cleaning equipment sprawling in corridors during temporary absence of the workman; electric cables running crazily about a

(Continued on page 90)

SAFER

liquid handling for Industry

This new Tokheim Industrial Hand Pump should add to the safety of your liquid handling methods. At the same time, it should speed up production and cut operating overhead. Pumps a wide variety of liquids. Fast, easy action with high vacuum efficiency. Available in hose and spout models for use with drums or underground tanks.



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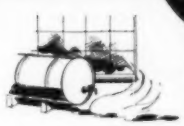
Special nozzle attachment eliminates dripping.



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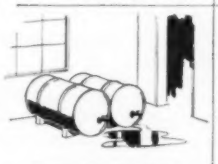
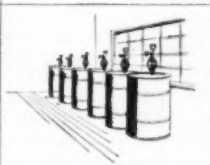
Pump is approved for use with petroleum liquids.



NO SLIPPERY FLOORS
Liquids don't reach floor to cause accidents.



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Write for literature and detailed information.

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Picture by courtesy of Westinghouse Electric Corp.
Safety Shoe Clock shows dress as well as more conventional types of safety work shoes.

Shoes with Eye-Appeal

(From p. 36) apparent immediately since the modified Munson toe, by virtue of its bluntness and characteristic high inner wall contour, detracted from the safety oxford design. New toe styles were developed which further refined the Munson shape, and consumer acceptance immediately indicated that toe safety could be much more speedily promoted with shoes having trim appearance and style appeal. Further toe shape improvements were developed and dress oxford toes became styled as closely as possible—all safety factors considered—to the section curvatures of non-safety dress toe shapes.

Brief marketing proved again that style sold toe safety, and dress shoes, in both bluchers and bals, quickly appeared having moccasin vamps, long and short wings with medallion tip perforations and cap toes having spaced perfs on tip lines. Welt extensions were increased to provide for improved modeling of the outsole and modified spade soles were offered with edge trimming carefully executed to simulate the sole shape of high style non-safety types.

Selected upper leathers of lighter weights were adopted for dress shoe constructions and, though the greater percentage of safety shoes made were still work types of heavy elk and horse uppers, dress safety shoes—with plenty of eye appeal—became sponsored by safety engineers everywhere as a means of getting better voluntary safety shoe protection on jobs that did not require the use of heavier high-cut work types.

In 1947 the demand for safety dress shoes nearly equalled that for heavier work types, and refreshment of shoe styling by all safety shoe manufacturers became constant apart from their critical interest in the improvement of shoe construction. New soling materials of synthetic resins, neoprene, rubber and cork provided the safety engineer with a means of better fitting industrial foot gear to its job, and the oil or acid resisting outsole became quickly recognized for its contribution to specialized industrial shoe performance. Improvements in lining materials and upper constructions were offered. Thread, welting, tacks and eyelets were overhauled for every possible contribution to safety shoe wear. In all of this progressive drive for physical improvement, competitive safety shoe styling continued at high pitch and shoes looked better each successive year—and sold better—and protected more feet. By 1949 the demand for dress and semi-dress safety shoes exceeded that for work types for the first time in safety shoe history.

Identical Twins—With a Difference

In that year a new and safer steel box toe was developed, together with a unique safety shoe last having an elevated portion directly behind the back edge location of the steel box toe, which design causes the underlying box toe to remain completely invisible and permits the finished shoe to look identical to regular dress constructions employing no steel toe whatever. Styling possibilities became unlimited in both dress and work footwear, since the new toe and last invited use of the lightest upper constructions without external distortion of the shoe forepart. The rearwardly extended wing portions of the new steel toe act as buttresses to the toe dome under conditions of normal and usual toe spring, and shoes employing this new toe and made on the described lasts are styled to

satisfy every taste and are available today from most safety shoemakers.

The progress of the oxford safety shoe deserves some analysis. A breakdown of the age groups of the labor force seems to tell a fairly factual story. From a 1949 report by the Department of Commerce, 24,705,000 (.612%) males between the ages of 18 and 44 were employed in the labor force, while 15,491,000 formed the group ages 45 and older. These figures could well explain the increasing popularity of the oxford safety shoe as most urban men under 45 today have been shod in oxford shoes from childhood and have but little use for high-cut shoes unless the severity of occupational conditions enforce their use. It seems significant that, since the next age group of 45 to 54 embodies 7,691,000 males, each passing year progressively adds hundreds of thousands of oxford-conscious safety shoe users to the already predominant percentage of males who, by preference, will take an oxford every time.

In this brief for well-styled safety shoes, no reflection is intended on the valuably important job of the safety work boot. It belongs. It is the unquestioned foot covering of the indoor or outdoor worker who needs the best performance possible from a leather shoe. No slight is offered the rubber safety boot. It has its specialized field to serve—and serves it best. Cosmetic shoe styling for the worker who must—jobwise—wear the toughest foot gear just doesn't add up.

The history of all footwear and the specific record of safety footwear certainly proves the decisive influence of shoe styling as *the* means of getting more shoes worn. After you are satisfied that your safety shoes are durable and comfortable, be sure that they are attractive enough to find their way onto feet, particularly where lighter dress types adequately serve the job requirement. Your percentage of protected toes is bound to skyrocket, and good shoe appearance will certainly be your shortcut to this important objective in which your volume shoemaker can and will give you every cooperation.

Photograph by courtesy of Safety Box Toe Co.

GLOVE COSTS REDUCED

with better hand protection

Edmont CASE RECORDS

No. 207—Shearing 20 ga. steel sheets, double canvas gloves lasted only 4 hours. Cost exceeded 10¢ per hour. Edmont-recommended Grab-it gloves, with non-skid, snag-proof rubber palm and thumb, now average 12 hours' service, reducing cost to 4 2/10¢ per hour. (58% saving).

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A LITTLE foresight now can save you and your co-workers much discomfort later on. Prepare ahead of time for the sweltering conditions when the thermometer skyrockets into the 90's. Check your fans; see that air conditioning and water cooling systems are in good working order; make sure there is a supply of salt tablets to replace the minerals lost through excessive sweating; see that there is anti-fogging supplies for goggles and faceshields; take an inventory of sweat bands on hand.

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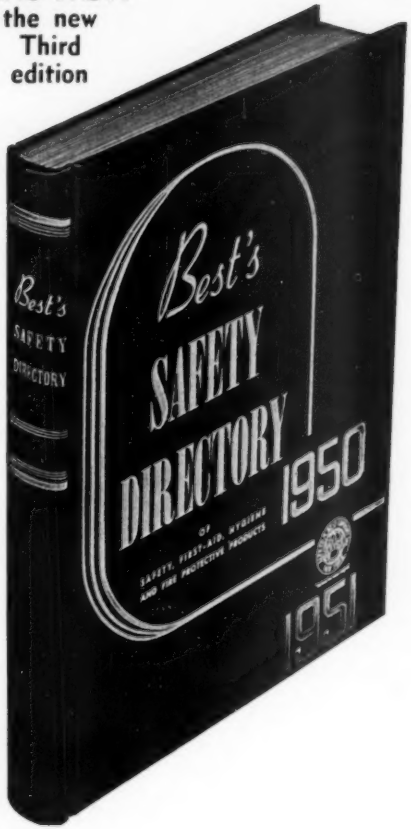

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The modern molded glass-fiber safety hat offers an unlimited color choice in addition to protection.

One of the earliest safety hats was made of sheet fiber which was covered with fabric and then with seven coats of asphalt paint.

By GEORGE HUFFMAN
E. D. Bullard Company
San Francisco, Calif.

NO HURT HEADS WITH HARD HATS

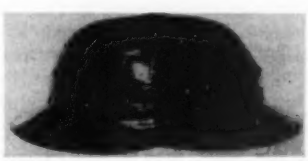
Although various types of head protectors have been worn for hundreds of years, it is only recently, through the use of new materials, that practical, wearable safety hats have been developed.

IN AN address given before the American Association of Industrial Physicians and Surgeons, last year, a leading physician told the gathering that a head injury can lead to neurosis or nervous disease. Even anticipation of an injury against which one is helpless, he continued, often keeps a worker in a state of nervous tension. The part, then, that safety hats play in modern industry may not be fully appreciated by the worker or by management.

We doubt that the Romans understood all that the medical profession now knows about workers, their reactions, and the lingering effects of accidents, but head protection was actually decreed almost 400 years ago. While it may not be the first safety order issued, Domenico Fontana, in charge of the construction of the Obelisk in front of St. Peter's in Rome, ordered all workmen to wear battle helmets to avoid head injuries. How their safety record compared with those being hung up by industries today is something that was not written into the report. But, it's a safe bet there were plenty of gripes about toting four pounds around on top of their heads; and it may have something to do with the fact that the practice of protecting workmen's heads was forgotten between 1586 and 1919. If you remember the old doughboy steel helmet, you won't wonder why protective hat wearing was unpopular. The materials available that were strong enough to offer protection were too heavy to be practical for industry's workers.

Protection Minus Weight

Yet, the toll of workers disabled —or killed—each year mounted as



Hard-boiled hat popular in the early thirties.

modern industry stepped up the pace. E. W. Bullard decided to do something about it, following his release from the Army after World War I. Thinking at that time was directed primarily to the mining industry. His company was essentially a mine supply house, and the need for miner's protection was great.

Safety hats turned out in the early '20's were a far cry from those in use today. Yet the needed impact resistance was there, and right from the start, reports of

Typical mine cap of the early thirties.

life-saving incidents were plentiful. The basic structure of hard hats then was sheet fiber, formed into a crown, brims added, covered with a skin of cloth, inside and out, then treated with seven to eight coats of asphalt paint to make it waterproof.

From then on it was a matter of constant development. No longer was it good enough to merely save lives. Such things as comfort, appearance, weight, color, size, long life and other factors influenced design and materials chosen. No other workers in the world are as conscious of comfort and style as the American worker.

With the introduction of the full-floating hammock-head-band development, protective hat comfort took on a new meaning. The difference in comfort might be compared with wearing a derby and a well-used felt hat. The margin of safety was also increased because the crown became an outer shell that absorbed shock without transmitting it to the head and neck.

Greatest progress in hat development came with the plastics era. While sheet fiber offered ample impact resistance, it broke down

Today's molded glass-fiber safety cap, which is designed for miners and steel erection crews.

under constant exposure to moisture. Molded plastic solved this and many other problems.

Improvements have been so numerous in the last few years that Federal Specifications under the Procurement Division are rewritten every year. They now include resistance to impact, moisture and electricity, and the material must not support a flame.

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Impact Resistance

Standard drop tests still consist of forty foot-pounds. Hats made of impregnated glass-fiber mats have passed tests of double that—or eighty foot-pounds. In actual use, however, "No injury" reports have been made by Safety Directors when workers have been struck by objects estimated to pack more than a 200 foot-pound wallop.

Natural resiliency of the human body may account for absorbing—or warding off—much of such a blow. Involuntarily, the knees bend and the body slumps with a blow. Just how much of a shock can be absorbed by a hard hat with a man in it cannot be accurately measured. But, according to a *Turtle Club* report, a five pound valve dropped sixty feet onto the safety hat of a worker—with no resulting injury. To figure the foot-pounds, multiply the weight by the height. Not all workers may be that fortunate. It does illustrate, however, that it is possible for a worker wearing an approved safety hat to withstand the blow of an object with 300 foot-pounds behind it. Little imagination is needed to estimate the damage to a worker without a hat.

There are, of course, practical limits to the amount of impact resistance that is built into a safety hat. Beyond the present point, the comfort feature would be sacrificed through added weight. A few years ago a hat that passed the standard drop test weighed more than a pound. Hats that pass twice the standard test today weigh 12 to 13 ounces.

Electrical Hazards

Dielectric strength has been increased even though the crowns are thinner. Molded glass-fiber is a natural insulator and because it has a strength to weight ratio in excess of steel, it needs no metal reinforcements. Where there is no danger of the worker coming in contact with electrical conductors, this is no factor, and an all metal hat

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is safe to wear. But, back to the matter of wearer comfort; radiation tests demonstrated that molded hats are cooler in direct sunlight. The difference ranges from 8% for brown hats to 12% for white hats.

With the introduction of molded colors it is no longer necessary to paint hats to designate work crews. Red, green, blue, yellow, in fact, any color can now be molded into hard hats. Colors became popular when the shipyards were operating at their peaks because it was easy for a foreman to spot members of his crew. A large steel company is now using molded red hats to designate members of their steel erection division. Many mines have adopted phosphorescent, glow-in-the-dark, hats for underground crews.

So, in addition to adding glamor to safety devices, color is playing an increasingly important part in making protective hat wearing popular—with management and with the worker. Above all other considerations, hard hats are now as easy to wear as any other hat.

Pictures by courtesy of E. D. Bullard Co.

Safety Reduces Mine Costs

THE Commonwealth of Pennsylvania has just paid a very tangible tribute to the safety achievements of bituminous coal mine operators in that state. It will lower their industrial accident insurance premiums.

The State's Compensation Bureau has announced that the insurance rate for bituminous coal mines will be markedly reduced for 1951. But what makes this action even more noteworthy is the fact that workmen's compensation benefits have been increased, in the last two years, from twenty dollars to twenty-five dollars a week. Even in the face of the higher benefit payments, the state officials find that the bituminous coal mines' safety records entitle them to lower rates for accident insurance.

The amount of money saved is not nearly so important as the real achievements this announcement recognizes. For three consecutive years now the bituminous coal industry has established new, all-time records for safe mining, and the mine operators in Pennsylvania have made great contributions to setting these successively higher standards.

These safety records have reflected multi-million dollar sums spent on safety; they have meant increased mechanization to give the miner the best and safest equipment available, and to make his job easier and therefore safer. And they have meant a constant campaign of educating everyone in the safe and careful way of doing his job. In short, they have meant the cooperation of good management and skilled workers.

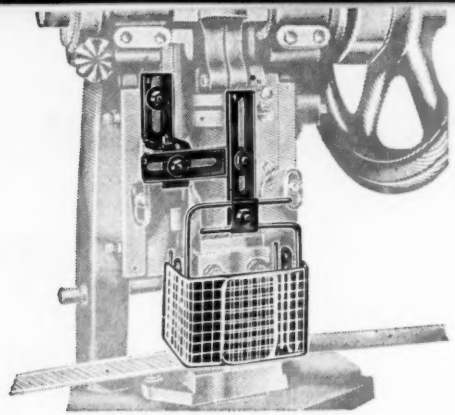

Figure 2. Old style guards caused eye fatigue

Progress in production and use of guards for metal-working machines.

By W. I. MARTIN*

The Growth of Guarding

IN MANY ways, improvement in methods of safeguarding metal-working machines has been as outstanding as that in the design of the machines themselves. From crude home-made, so-called guards for power presses, grinding wheels and other machines, there has evolved a wide variety of efficient, serviceable safety devices. These have reduced accident rates to a low figure as compared to the statistics of several years ago.

In the early days, grinding wheels were left unguarded as the operator depended only on goggles to protect his eyes. At a later date an unlighted piece of glass was used over the wheel to stop flying particles. In many cases, however, shields served to mirror the operator, and because of annoying reflection, they actually handicapped production. Today the wheel itself is guarded with heavy steel housing and a large illuminated safety glass shield covers the entire wheel, thereby affording a high degree of protection without slowing down on output. (Fig. 1)

Figure 1. Eye shield for grinder

Fig. 3. New style guards give better visibility

Dust collectors are now used to protect the lungs of the worker and the bearings of the machines. The operator can see his work under correct lighting conditions and he is protected not only from flying particles but also from the possibility of an exploding wheel. Die enclosures for blanking operations no longer need be rigid cages made of expanded metal or wire screen to cause eye fatigue when looking through the mesh at the moving ram. (Fig. 2) We now have standard adjustable guards made with vertical slots or transparent plastic gates for easy visability. (Fig. 3)

Point-of-Operation

Point of operation guards for secondary, hand-fed work (Fig. 4) have been developed from types of limited protective value to those that remove the hands every time the ram descends or another variety of safety guard which requires that both hands be out of the danger zone before the machine can be tripped.

Management now realizes that by eliminating *fear of accident* through proper training, approved safety devices and educational signs, a substantial increase in production can be expected. In a very short time this larger output more than covers the cost of an adequate safety program.

Were it not for the element of

* Mr. Martin is recognized as an authority in the field of safeguarding metal-working machines. His experience covers more than a score of years and at present he heads an organization devoted to the production of machine guards. —Editor.

fear, production could be increased even on an unguarded machine. A conservative estimate is that fear cuts output not less than 25%. But it should be obvious that a guard which provides full safety without obstructing production removes any psychological barrier and thus saves time and suffering, while contributing to output.

Despite prevalent belief, no guard yet invented completely provides the ultimate in safety without the cooperation of the operator. While there have been slight changes in human nature over a 500 or a 5,000 year period, there is no perceptible change in mankind and his general attitude toward safety during the past five decades.

Fortunately however there has been a most salutary change in management's attitude over recent years. Today, top management recognizes the unnecessary expense of accidents reflected in greater insurance costs and labor loss. Progressive management knows full well that they profit through safe production. Without specific training, today's worker is no safer than his father. All of us must realize that the machine operator of mature years has work habits which

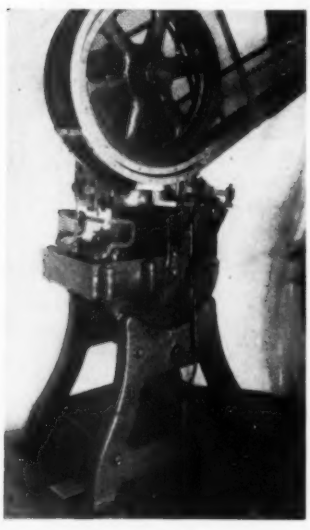

Figure 4. Hand-fed guard

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cannot be changed as readily as those of a teen-ager. Constant supervisory attention therefore is just as important to safeguard the older worker as preliminary training to inculcate safe practices into the younger man. Special attention also must be given to the individual who may be characterized as accident-prone and who never should be permitted to work on any machine which can be unguarded for a moment.

In the matter of educating workers to the multiple advantages of safety, busy management needs all possible assistance, as we cannot depend upon the printed page alone to maintain the operator's individual interest. In this connection, however, safety posters and pictures have done much to arouse this necessary interest and such illustrations serve an excellent purpose, particularly if they embody the appeal of human interest, a touch of humor or a fanciful approach.

In time, the safety guard maker will have a travelling field force showing approved safety methods for use in various industrial centers.

Professional Aid

Many medicines are advertised in the daily press and over the radio but the wise man calls his doctor when a member of his family is ill. Obviously the large, well-organized plants having trained personnel as "Doctors in Safety" are fully equipped to handle problems of accident prevention, but a large percentage of the smaller plants can be responsible for a heavy percentage of injuries.

Even the smaller plant can find his own "Doctor of Safety" on the staff of his insurance carrier. And it is the industrial safety engineer and certainly the insurance company engineer who can give the best interpretation of accepted safety codes.

It has been said that this is rapidly becoming a woman's world. Certainly more women are taking their place in industry generally and specifically in metal working plants. Many female workers are to be found operating power presses and grinding wheels. At the opening of the century less than 1 in 5 workers were women, but today the picture is permanently changing. Management appreciates the necessity of greater care in the clothing of female industrial employees and certainly the value of improving sanitary conditions.

The folly of providing only partial safety in a plant is obvious. The difference between 1915, for example, and 1951 in plant safety is that we no longer take steps to guard the machine after an accident but rather do we strive to prevent the accident by providing the protection on the machine and selling safety to the operator. The publication, SAFETY MAINTENANCE & PRODUCTION has consistently pointed out the need for removing the fear element. Since the inaugural issue of the publication 50 years ago, it has emphasized the need for dependable safeguards scientifically designed to eliminate or greatly minimize the chance of an accident and at the same time stressed that safety is an integral part of production.

While there have been great strides in machine guarding, the most successful plants have combined man-training with machine safety. No plant attains satisfactory results in accident prevention unless it gives adequate attention to the human element and recognizes that efficient production is not possible without safe equipment and safe practices.

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Pictures from the collection of **H. W. Beegle.**

Photographic prints were made with the help of sunlight in these workrooms around the turn of the century.

EASTMAN DEVELOPS SAFETY TOO

By SYDNEY E. CLARKE
Plant Engineer, Hawk-Eye Works
Eastman Kodak Company

A picture of the sensible program set up by the various divisions of the Eastman Kodak Company to solve their sometimes unique safety problems.

GEORGE EASTMAN keynoted the interest of Eastman Kodak Company management in the health and safety of employees when he appointed a Kodak safety committee in 1911.

Since that first committee, over a period of 40 years, management's interest has never faltered, and the company's safety program has grown to a point that brought Kodak 26 awards in the Associated Industries of New York State Incorporated's 1950 campaign.

From the start, prevention has been the dominant theme—prevention of accidents, prevention of sickness and of absenteeism. Company executives have gone all out to reduce or eliminate any factor that might compromise the goal set for Kodak people, a goal of health and safety at their chosen place of work.

In general the company's policy is to do all that is reasonable to prevent injury to persons and damage to property and to protect the interest of its men and women, the company, the customer, and the public from the standpoint of accident and fire prevention.

What Is "Reasonable"?

While this statement is quite simple, it is obvious that interpretation of the word "reasonable" is an important and sometimes difficult consideration. In interpreting this policy, Kodak goes to great lengths to make sure that fire and accident hazards are adequately safeguarded by proper equipment, materials, methods and trained and instructed employees.

Since 1933, safety has been taught as a regular factor, along with cost and quality and other

problems, in the company's supervisory training program.

While adhering to the central theme of prevention, the organization of safety practices has varied somewhat from plant to plant.

At Kodak Park, the plant that produces photographic film, paper and chemicals, everything which should be done in the way of methods, equipment and various safeguards must be taken care of before the personnel are asked to undertake their share in the safety program by following established safe procedures.

Kodak Park fire prevention and safety is a line management responsibility from top management to the direct supervisor. Management at all levels is assisted by a department of fire prevention and safety. In addition, each of the many departments has its own safety leader or co-ordinator.

These safety leaders meet monthly with the Department of Fire Prevention and Safety, forming a decentralized staff organization to assist the direct supervisor in carrying out his responsibility.

EASTMAN KODAK COMPANY

ROCHESTER, N.Y

April 18th, 1911.

Mr. F. W. Barnes,

C i t y ,

Dear Sir:-

You are hereby notified that a Committee of Safety has been appointed, on which you are requested to act as a member, the committee being composed as follows: Mr. Robertson, Chairman; yourself, Mr. Folmer, Mr. Ruttan, Mr. Haste or his appointee, and Mr. McCanne, Secretary.

The object of this committee is to investigate and further the adoption of all practicable safety appliances in the various factories of the Company. The committee will meet on call of the Chairman. The Secretary will keep a record of the proceedings of the committee; have charge of the collection of all information from outside sources; and keep a record and tabulate the causes of accidents in the different factories, which are to be reported to him through the member of the committee representing the factory where the accident has occurred. It is hoped that through the advice of such a committee a large percentage of the accidents which now occur may be prevented.

Yours very truly,

Geo Eastman

This is the letter with which George Eastman, founder of Eastman Kodak Company, keynoted the company's interest in safety in 1911. From this beginning, the company's safety departments have grown.

The Basic Man

The foreman is still the basic man. He has close, daily contact with the employees. He knows employee attitudes and habits, safety strength and weakness. He is on hand an average of eight hours a day to give them guidance and instruction in the application of safety principles to their work.

An early photographer starts out with camera, a portable folded dark tent, and collodion wet plate equipment strapped on his back.

New employees receive safety instruction in a regular indoctrination meeting immediately after their selection. On a regular schedule the safety department explains, through a 30-minute motion picture and talks, the general precautions taken in the plant and the fundamental safety principles. After this preliminary orientation in Kodak's safety attitudes, the new employees get special instruction in their particular departments, depending on the type of work or machinery to which they are assigned.

The development of safeguards using electric, pneumatic and mechanical interlocking methods is a feature of the company's safety, particularly for machines which must be used in almost total darkness, one of KP's unique problems. Control of flammable vapor atmospheres in recovery equipment

About 75 years ago, the amateur-plate cameraman had to take a darkroom with him wherever he went. The engraving shows a tent being used as the cameraman's field darkroom.

through gas analysis is another major Kodak Park development.

Eye and Foot Safety

Eyes come in for extra attention. Safety glasses are widely used in chemical departments, machine shops, and field crews. The eye program has saved many eyes—as many as eight in a single month. There are men at Kodak Park who have had both eyes saved. The special program for persons who have deficient sight in one eye has saved their one remaining good eye in a number of instances. Purchase of many thousand pairs of shoes from the plant's safety shoe store has reduced materially the number of foot injuries over the years.

The Deluge Is Here

Safety instruction is not complete until the Kodak Park system of emergency showers and water deluges is explained to employees involved in work with acids or other harmful chemicals. The chemical workers learn that in an emergency they can step in a matter of seconds into a protective or cleansing shower of water.

Proper methods of turning in fire alarms are part of the instructions. The professional, full-time fire department, a part of the Department of Fire Prevention and Safety, at the plant has 26 men who provide 24-hour protection with an eye to the large quantities of solvents stored in certain areas. In the event of a fire that brings chemical fumes, 80 men are available who are trained in oxygen-breathing apparatus and gas-tight suits.

Specialists on the Job

Specialization is characteristic of the safety department at Camera Works, the company's plant for production of cameras and accessories. The safety director has given one man, for example, the responsibility of liaison with the medical department. If an accident occurs, this man handles the report and follows up the case, even to the extent of cooperating in placement when the employee returns to work. Long association has given this specialist complete familiarity with the medical department's procedures and personnel, and the work of both departments has been made easier.

Similarly, another staff member pays close attention to the purchasing of protective clothing, respirators, goggles, gas masks, and similar equipment. Another inspects all punch presses and approves dies in the punch press department. Each member of the department has a definite area in which he conducts inspections and for which he bears responsibility.

The punch press and woodworking department employees get additional time in the plan of safety

(Continued on next page)

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instruction at Camera Works. With what is probably the largest punch press force in Rochester, the plant long ago installed extensive guard equipment. The devices range from standard sweep and compressed air guards to a photoelectric cell. The value of these protective units in terms of safety is explained to new members of the department before they begin work and to all members at regular periodic meetings.

The Camera Works safety department has great faith in safety instruction provided in the Kodak employee newspaper, "Kodakery." This weekly newspaper goes to the employees' homes every Thursday. There, along with the news of plant and office, the safety message is brought to the attention of the employee and his family. Added emphasis comes to the safety message when it is influenced by the wife's concern for her husband's welfare at his work.

Year-'Round Safety

The department is willing to debate the value of short term safety contests. It believes that the ballyhoo of a contest is more likely to bring tension and a tendency to conceal small injuries that might "hurt the record" than improved safety. And in the ending of such a contest there may come relaxation and an actual slump in safety effort. The Camera Works staff feels that it is far better to build safety consciousness steadily on its own merit and to declare a safety contest "52 weeks a year."

The value of the employee suggestion system in the program is praised, on the other hand. The example is cited of two employees who had an idea for a new press guard in the 1920's. The men submitted their idea to Camera Works management through the suggestion system. Their idea, when adopted, led to the invention of the double wing press guard, now widely used in industry.

The plant's watchmen and guards are supervised by the safety head. On their nightly rounds the guards scout for the forgotten electrical connection or the hazard of a blocked aisle. They take corrective action at once when an actual or potential hazard is discovered. Later their formal report reaches the foreman for remedial action.

Usually a department of special problems for safety men, the punch press department at Camera Works has been so controlled and instructed that it has become traditionally linked to the plant's good record. Before the World War II expansion, in fact, the department's operations occasionally ran full 12-months periods without a single lost time accident.

Hawk-Eye Works

At Hawk-Eye Works, Kodak's lens and optical goods plant, good use was made of George Eastman's idea of an active safety committee.

World War II brought increased problems to all industry, and Hawk-Eye was no exception. As a result, foremen were called together in October, 1942, and from their discussion came a plan for a safety "leader" system. Briefly, the plan involved appointing an employee to assist each foreman in safety inspections. The position of "leader" was rotated among employees. As each person served his term in the key inspection position, the entire group of employees became more safety conscious.

One unusual project was designed to help in the return of large numbers of veterans in the latter part of World War II. It consisted of a cooperative study by the plant's safety and medical departments to summarize requirements of various jobs in the plant. When these requirements were compiled in terms of sex, vision, hands, locomotion, hearing, stamina, dexterity, and other factors, reference to a prepared table gave at a glance the requirements of any one job so far as a disabled veteran might be concerned.

The safety record at Hawk-Eye

has been topnotch for years. For five years of the 1930's the plant won trophies for the best record in a particular class. Twice a 100 percent certificate for completion of a campaign without a lost-time mishap was awarded.

Over the years since 1911 there has been a steady reduction of accidents in all of Kodak's Rochester plants. The average rate during the decade, 1910–1920, for example, was 43 per thousand employees. During the next ten years, 1920–1930, the average rate declined to 25 per thousand. Even this figure was reduced through 1930–1940 to 13 per thousand.

Eastman Kodak's 5-year accident frequency average from 1940 through 1945 was approximately three times better than that of all industries in the nation and twice as good as that of its related chemical industries.

Kodak safety supervisors are frank in attributing the success of their various programs to the continued interest of Kodak management. The safety men point out that the company's management early recognized the value of a safety program from both the humanitarian and economic points of view, and that out of this recognition came full support.

The cost of the sizeable effort put forth for the welfare of employees has been a substantial part of the cost of production in the Kodak plants. But the resultant record of Kodak safety is considered a priceless dividend.

Pictures by courtesy of Eastman Kodak Company.

Willson Appointment

THE Board of Directors of Willson Products, Inc., Reading, Pa., announces the election of Thomas A. Willson, Jr. as Vice-President. Mr. Willson will also continue with his duties as Assistant Secretary of the corporation, a position he has held since 1947.

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The Fifth Freedom

(From page 34) be considered the "clodhopper" it once was called and employees are more willing to wear the protective type of shoe.

Likewise the style trend in eye protection from the once-clumsy "goggle" to the present "prescription ground glasses" mounted in styled frames for "looks" as well as "protection," has shifted the emphasis from one of enforcing people to wear them to an easy acceptance for protection.

Employee Suggestion Plan

Making the employee "a part of" instead of "apart from" the safety program is another vital part of accident prevention by Westinghouse. This is brought about in part through the medium of the Employee Suggestion Plan, which arises from the belief: "No one of us is as smart as all of us."

Through this plan have come literally hundreds of ideas to accident-proof machine tools and material handling operations. It is estimated that about 12 per cent of all adopted suggestions are ideas for the prevention of accidents.

When employees are given an opportunity to help, freedom from accidents becomes an employee responsibility and a contribution to the other fellow's well-being. One of the early recorded ideas was the vacuum cup tool for removing a metal piece from a punch press; another was for an eyelet-machine guard, which saved five finger injuries the first year it was installed.

"Make the machines safe for the man to use" is today's principle versus the old principle, "Make the man safe from the machine."

Good Housekeeping

While it is known that guards and similar protective devices have contributed greatly to the reduction in accidents, good housekeeping by way of better plant layout and improved handling equipment has also played an important part. One of the early accident hazards was line shafts and their attendant belts to machine tools. The development of the dependable induction motor changed all that, however, for in the modern plant today's machine tools are individually motorized. Thus one of the worst accident hazards of yesteryear has been eliminated.

Engineered plant layout is also a contributing factor to the reduction of accidents. An interesting comparison of a former plant layout with today's is shown in Figure 5, a transformer production aisle in the 20's and Figure 6, a transformer production aisle in the 50's. Note the difference in working conditions, line shafting, lack of overhead cranes in comparison with individually-powered tools, plenty of work room and overhead cranes.

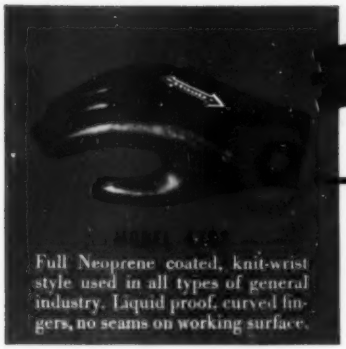
Flammable Liquid Storage

The storing of volatile substances is always a matter of concern for the safety-minded plant, and in Figure 4 is a good example of ease in handling coupled with safety in the use of a floor-operated bridge crane and movable ladders. Here is shown also the essential vapor-proof electrical fittings and lighting fixtures. Other factors are spark-proof floors and tools, exhaust fans, spring-closing glass valves on drums, drip pans under valves—all to insure complete safety.

Proper light is another factor of safety and one of the best accident-deterrents. Good lighting gives adequate illumination and eliminates shadows, making it easier for the workmen to see and offering less chance of injury.

First Aid & Health

We have traveled a long way from the so-called "first aid" station to the modern and completely-equipped Medical Department



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where employees are encouraged to "visit" rather than be "affeerd" to go, thus encouraging employees to get medical treatment at the early stages of a scratch, burn or bruise. The appointment of Dr. T. Lyle Hazlett as a Director of the Medical Department as early as 1920 began the change in emphasis from one of "patching up" after the fact to the "ounce of prevention" idea. Initially the principal concern of the Medical Department was the treatment of industrial accidents, however, the scope has now broadened to the over-all welfare and health of all employees.

The Commonwealth of Pennsylvania Department of Health has granted authority to Westinghouse to maintain a State dispensary for tuberculosis at the East Pittsburgh plant. This medical unit is the only one in the country to be granted this privilege.

At this time the University of Pittsburgh School of Medicine and the School of Nursing accepts practical aid from the East Pittsburgh medical department for in-plant training of graduate physicians and nurses.

Industrial concerns from this country and abroad have studied and adopted many of the features of our medical policies and practices.

The cost to Westinghouse to maintain its medical department is close to $1 million a year. In addition, Westinghouse has made in the past few years a free will contribution exceeding $400,000 in support of hospitals near our plant locations.

The Medical Department employs a staff of approximately 12 full time physicians; 22 part time physicians; 91 registered nurses; 4 industrial hygiene engineers; 2 chemists; 3 technicians and clerical and stenographic personnel. The medical equipment for this staff cost is in excess of $200,000.

As the company expanded its facilities, manufactured new and different products and made use of a wide variety of chemicals in manufacturing, the problem of hygiene became an important phase of the accident prevention problem. The first Hygiene Engineer concerned himself principally with dust-control problems for the elimination of the hazard of silicosis. Later, he became concerned with the problems of eliminating toxic fumes from pickling and plating operations, the harmful fumes from the spray-paint operations, the reduction of exposures, radiation hazards and the concentration of combustible or explosive mixtures.

Dermatitis problems have been many and varied, and those due to contaminated cutting oils have been best solved through filtering and pasteurizing, while others have been eliminated by the use of protective gloves.

While enforcement is necessary

Is Your Plant One of *the 16,000 Communities Protected by Modern Resuscitators?*

"Every major fire department in the country uses resuscitators except one", says the SATURDAY EVENING POST on page 59 of the June 24, 1950 issue.

Daily throughout the country these automatic positive-and-negative breathing machines are bringing victims "back from the brink" . . .

Auto accidents	Gas poisoning (coal, illuminating, industrial, monoxide)
Smoke suffocation	Asphyxia of new born babies
Heart attacks	Hospital emergencies
Electric shock	

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in some installations, and rules and regulations are essential for order and education, the emphasis by Westinghouse has been one-of-avoiding compulsion, emphasizing education and training for safe work habits and engendering respect for the fellow-workers and for their equipment.

Report forms for the recording of unsafe conditions of equipment or workplace, safety rules to follow when doing maintenance and repair work, guides for lifting are a part of the system of keeping the prevention of accidents "out front" at all times. "Danger Tags" hung on strategically-located tag boards are used to promote the practice of tagging hazardous equipment to prevent use by employees or to assist in the safe service of machines and equipment.

Creating Employee Interest

It has been said that the development of safe work habits is a never-ending problem of education and training. The real problem, of course, is "how to get the employee interested in freedom from accidents."

One very successful promotion was a Safety Poster Contest in one of the divisions (East Pittsburgh). Employees were offered cash prizes for the best posters submitted. Fellow-workers were judges. Another unusual promotion, this one for industrial truck drivers, is held annually by another division (Buffalo) and is called "Truck Rodeo." Electric truck drivers are pitted against each other over an obstacle course. The driver with the best overall score wins. The driver in one test is required to negotiate his truck between a staggered row of empty oil drums. If he touches the drums, he gets demerits. Another test requires a driver to go between two uprights after first guessing from a distance of twenty feet whether this is possible or not. These and similar tests of driving skill have done much to improve their accident rate.

The strained back and the teaching of better lifting habits are problems of long-standing, and a unique way for demonstrating the proper and improper way to lift an object from the floor can be found through the use of the wooden models at the Baltimore and East Springfield plants.

Supervisory Training

One of the most important phases of any accident prevention program is the attitude, skill and leadership of the supervisory group. A "graduate" course for supervisors is a continuing process with Westinghouse. In the development of these courses, every effort is made to have each session different, interesting and practical. Visual aids, sound movies, flip-over charts, slap-on boards, worksheets and experience discussions are but a few of the aids that have proved effective in the six-session, nine-hour Accident Prevention Course. All new or prospective foremen are required to take this course as a part of their overall management training.

Recognizing the value of employees in the control of accidents, safety observers are selected by foremen among certain workers who have shown an interest in the safety movement. These workmen act as observers of practices and report unsafe work habits or conditions which should be corrected and which finally result in review at the Safety Policy Committee level.

We are constantly striving to make workplaces at Westinghouse better and safer places to work, and we believe that a balanced program of accident prevention does much in this regard. We are constantly endeavoring to guard machines in working areas from all hazards, to continue safety education and training, to improve with research in the areas of health

control and to do all possible to improve the person-to-person relationships between supervisors and workmen. The end objective is, of course,—a firmer and stronger belief in the Fifth Freedom—Freedom from Accidents.

Pictures by courtesy of Westinghouse Electric Corp.

G.E.'s Voice of Safety

(From page 52) which is given to every new employee. In addition to this general orientation booklet, a number of other publications describe the practices and rules to be followed for specific types of work. These deal with the operation of such things as drill presses, battery trucks, milling machines, lathes, and similar equipment.

Supervisor as Key Man

If any single group can be said to have contributed most to the progress in making every job safer, it is the supervisors who deserve the credit. Back in 1916 the Safety Committee first recognized that "the best results for safety of employment will not be obtained unless superintendents, foremen and assistant foremen have been brought into hearty sympathy with the company's efforts in this direction. These men, each one in his own way, will find practical means of transmitting their own safety convictions into the minds of the workmen directly under their charge."

Today, more than ever, the supervisor is the key man who carries the company's accident prevention program directly to the work place of each employee. Many company activities are designed to assist supervisors in carrying out this job. These include manuals, publicity in employee publications, and training aids of every description. In many of the company's plants, employee safety committees have been organized to assist the supervisors in spotting and correcting hazards and in training employees in safe work methods. Suggestion systems provide a means for every employee to submit ideas which may assist in eliminating hazards. Safety engineers and industrial hygienists are available for professional advice in solving technical accident prevention problems. Good housekeeping campaigns are stressed to assist in providing a safe working environment, and high priority is given to safety maintenance. Accident prevention is a basic subject in supervisory and employee training programs.

When accidents do occur, they are investigated rigorously. Every effort is made to take positive steps, not only to make repetition of the accident impossible, but to make sure individuals throughout the organization have the opportunity to be guided by all the lessons to be learned from the experience. Safety rules are a part of every employee handbook. Many of the company's plants have contests for recognition of outstanding achievement in safe operation.

"Safety Sam" is an animated cartoon character who speaks for the General Electric safety program in the company's *(To page 81)*

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LEARNING THE EASY WAY!

STEEL-worker Ben Fernandez has good reason to be eternally grateful to his pair of goggles which undoubtedly saved his eyesight when splashes of molten metal covered his face with burns from which he quickly recovered.

Picture at the left shows this employee of Colorado Fuel and Iron Corporation with second and third degree burns on the face and neck but with no harm to the eyes. Picture at right shows Fernandez after medical care.

It requires no stretch of the imagination to assume that Ben will always be a vigorous champion of eye protective devices at Colorado Fuel and Iron Corporation. A pair of eyes saved can be chalked up for the goggles shown in the accompanying illustration.

Here is one steel-worker who has the wisdom to know that it is not always necessary to learn the hard way!

Learning the Hard Way

BUMPED LOAD

HOW can poor maintenance cause accidents? All too easily! Uneven floor surfaces have caused many accidents and they have even resulted in death. A lumber handler, for example, was killed when he was struck by a load of 8 x 8 timbers that fell from a fork lift truck. The load fell apart when the truck went off balance after hitting a bump in the yard planking. Poor maintenance was the basic cause of this accident, but power truck operators must also be trained to be on the lookout for possible hazards and see that their loads are well secured.

FULLY PREPARED?

A MAINTENANCE employee was burned on the legs and face by sulfuric acid when he opened a line at the flange to see if acid had flowed into it. Although, fortunately, he was wearing goggles which protected his eyes, he was not wearing rubber clothing nor a face shield or hood to protect his head. In addition, he had not complied with the standard precaution of bleeding the pressure from the line. The responsibility for this carelessness lies partly with the foreman, who had not made certain that standard instructions were being followed and that the employee was properly dressed.

G.E.'s Voice of Safety

(From page 79)

indoctrination film, "The Voice of Safety." After reviewing the company's part in the safety program, he concludes with a summary of the basic safety responsibilities of every employee. "This," says Safety Sam, "is your five-point safety program:

"1. Learn the safety instructions and follow them.
2. Pay close attention to your work and avoid unsafe acts.
3. Use the personal protective equipment required for your job.
4. Eliminate or report unsafe conditions promptly.
5. If you do get hurt, no matter how slight the injury, get first aid."

In the forty years since the first G.E. safety committee met, accident prevention has thus become a standard part of every job. The safety program reaches every supervisor and every employee. Every plant, every laboratory, and every machine shows its influence. If any single conclusion can be drawn from G.E.'s experience, it is that "accidents" are not accidents. They are caused—and they can be prevented.

Long since it became evident that we were making the factory safer than the home or vacation spot. So, we went on beyond the job-connected safety problems to those off-the-job, and have sought to cooperate with our employees in developing an around-the-clock, seven-days-a-week personal safety program for employees and their families. Also, many G.E. personnel are active participants in community-wide safety council activities to advance home, traffic, school, and recreation safety.

In short, General Electric believes that the great American citizen is so valuable a contributor to his own and his fellow citizens' material and spiritual well-being both on and off the job that he just must not needlessly be separated from making that contribution.

Photographs by courtesy of the General Electric Co.

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Check these Advantages
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Weapons Against Fire

(Continued from page 43)

emulsion of the flammable liquid. Water spray nozzles were produced both for use on fixed systems and for portable use with hose lines. We have already noted that a patent was issued for a fire fighting water spray nozzle in 1896.

The foam extinguishing equipment in use up until this time depended upon a chemical reaction to produce the foam. Mechanical foam was introduced during this decade. It made use of a foam stabilizing liquid which was mixed with water in the proper proportion, the foam being produced by the inspiration of air.

Another modification of fire extinguishing equipment was introduced late in this decade. Previously, fixed carbon dioxide systems had utilized high pressure storage of the gas at normal

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The Reece "Hot Foot" sandals. Protect your feet in furnace and coke oven rooms. Straps on over your own shoes. Heat resistant wooden sole, strong galvanized iron counter, flexible hinge toe. Cannot slip.
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temperatures. The new system involved storage of the gas in refrigerated containers so that much lower pressures were involved.

1940–1950

An early development in this decade was that of extinguishing materials for metal fires. This was a direct result of the increasing use of magnesium in industry, production having jumped from 6,000,000 lbs. in 1939 to 30,000,000 lbs. in 1941. Added impetus was given to this development by the threat of incendiary bombings. These early materials were applied by throwing onto the metal fires.

A new, and apparently much more effective, vaporizing liquid was introduced during this period. It was chlorobromomethane, first tested in Germany. It is said that a large proportion of the losses of German aircraft during the war were because of fire and that this loss would have been cut to a great extent if chlorobromomethane could have been produced in greater quantities.

Methyl bromide was found to be a very good extinguishing material, but its use has been limited because of its toxicity. It has found a very valuable application, however, in extinguishing systems for the engine spaces of aircraft.

Another material that had been known for quite some time was tested as an aid to fire extinguishment. Wetting agents were found to be valuable to cause penetration of tightly packed materials such as cotton bales.

It was during this decade that dry chemical became recognized as a very effective extinguishing material because of improvements in the extinguishing media and in the means of application. A new application of this extinguishing material has been the development of piped systems which will flood entire rooms or apply the dry chemical directly to tanks or other special hazards.

One of the newest products is an extinguisher for use on metal fires. Increased use of liquid metals with their attendant hazards, gave impetus to this development which permitted the first controlled application of such an extinguishing material.

All of us anticipate that industry's growth in the next 50 years will be even greater than that of the last half-century. We are all looking forward to the taming of atomic energy to the point where its tremendous force will be applied to peaceful purposes.

Fire protection engineers realize that with this growth will come new problems and new fire hazards. They are dedicating themselves to the task of solving these problems as they arise. To this end an extensive amount of research is being conducted by these engineers in industry and government.

Proof of the effectiveness of this research program will be shown when SAFETY MAINTENANCE AND PRODUCTION publishes its 100th anniversary edition!

Pictures by courtesy of Ansul Chemical Co.

Atomic Energy Program Reduces Injuries 22%

THE U. S. Atomic Energy Commission has announced that during 1950 the national atomic energy program was operated with an average of 4.67 employees injured for every million man-hours worked, a 22 percent improvement over 1949. The 1949 rate for all U. S. industry, the most recent reported by the National Safety Council, was 10.14.

A break-down of the 1950 safety figures shows the following:

1. AEC operations contractors in 1950 incurred employee injuries at a rate of 3.32 per million man-hours, compared with a rate of 7.4

for workers in the chemical industry, the nearest comparable, according to preliminary data compiled by the Bureau of Labor Statistics for 1950.

2. Construction workers on atomic energy projects recorded an injury rate of 8.35 for 1950 which was 17 percent below the 1949 rate. The rate for all U. S. construction in 1949, the latest NSC figure available, was 19.48.

3. AEC direct employee injuries in 1950 occurred at a rate of 2.05 per million man-hours compared with 3.98 in 1949. The 1950 injury rate for all Federal civilian employees, as compiled by the Federal Interdepartmental Safety Council, was 7.57.

4. The motor vehicle accident rate, including all AEC-owned vehicles, whether driven by AEC or contractor employees, was 1.50 accidents per 100,000 miles driven in 1950 compared with 1.62 in 1949. The national average for the period July 1, 1948, through June 30, 1949, the latest period for which NSC figures are available, was 3.13.

5. There were eight fatalities in the atomic energy program in 1950 compared with six in 1949. None were due to radiation. Expressed in terms of rate per 100,000 workers, the fatality rate for 1949 was 10.2 and for 1950 was 13.1. The NSC fatality rate for all U. S. industry in 1949 was 26.0.

The only category to show a substantial increase in 1950 over 1949 was industrial property loss due to fire. The dollar value of this loss in 1950 was $486,389, compared to $48,096 in 1949. This increase was due mainly to fires in an engineering building at the Berkeley Radiation Laboratory and in an electrical switchyard at Oak Ridge. No employee was injured in either fire. The 1950 AEC fire loss, despite these two large fires, was 2.5 cents per $100 valuation compared with a generally-accepted national average of 15 cents.

Important contributors to the personnel safety record of the atomic energy program are 20 contractors and four AEC field offices who have worked without disabling a single employee in either 1949 or 1950.

In addition, 12 atomic energy contractors and one AEC field office have been declared winners of the 1950 AEC Safety Contest, an annual feature of the AEC's safety program. A total of 90 contractors and 9 AEC field offices were grouped in the competition according to kind of work and number of employees, and winners were designated on the basis of greatest percentage of improvement in decreasing employee injuries in 1950 over their respective injury records for the preceding year. They have given major emphasis to the AEC's safety program.

37
FALLING ACCIDENTS
EVERY HOUR*
WILL ONE OF YOUR MEN BE NEXT?
Every hour, falling accidents kill or disable 37 workmen!*
Are you sure your men are safe from unsafe footing?
You can give your workmen maximum protection against costly slipping and falling accidents with A. W. ALGRIP Abrasive Rolled Steel Floor Plate. ALGRIP is made by rolling tough abrasive grain as an integral part of the upper portion of steel floor plate. Wet or dry ALGRIP gives non-slip protection even on steep inclines. Wear only exposes new abrasive particles so maintenance is not required.
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*17% of the 222 occupational injuries which occur every hour are due to falls. Source: National Safety Council's 1949 edition of Accident Facts.

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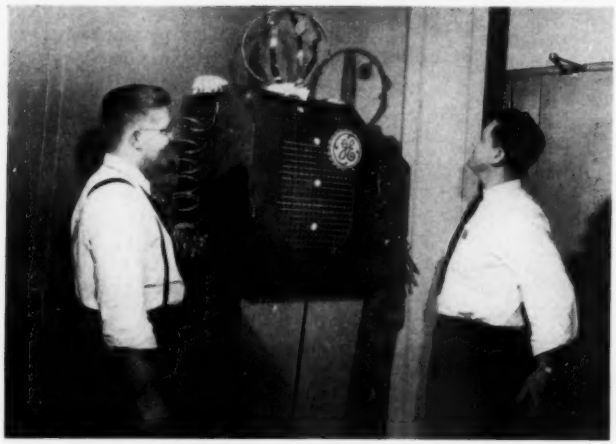
SAFETY MAINTENANCE & PRODUCTION Salutes a Safety Idea for JUNE



Safety Raises Its Voice

THE General Electric Company has built up and is maintaining a successful accident prevention program. Part of the success of their efforts is due to the fact that those who are responsible for safety in the G.E. plants are acutely aware of the need for constantly reminding workers of the hazards which surround them.

Like the other forward-looking plants, the safety personnel are making excellent use of posters, publications, and training sessions. In addition, they have worked out their own unique methods of keeping employees on their safety toes.

One of the novel stunts which this magazine is saluting this month is G.E.'s Electronic Safety Man. When placed at hazardous areas where workers need to be reminded of existing dangers, the Electronic Safety Man speaks directly to the employee by means of a tape recording. For example, when a wired mat is stepped on, the Electronic Man delivers a short safety talk. As shown in the picture above, the unit in one location has been given a head (note shadow on the wall), arms and hands, and has been dressed up with such festive touches as a white tie, epaulettes, buttons and a G.E. medal.

Picture by courtesy of the General Electric Co.

Pennsylvania R. R. Schedules Protection

(From page 46) failed, this punitive step is taken for the protection of the public, fellow workers, and the interests of the company.

The standardization of practices and working procedures (for methods of reporting accidents and safety activities, for operating conditions, and for safety equipment) is obtained through the cooperation of the Safety, Medical, and Test Departments of the railroad, using the facilities of the Physical and Chemical Testing Laboratories and the consulting services of specialists and experts in the field. The Safety Department receives complete accident reports from the divisions and regions of the railroad, and analyzes them for the purpose of classifying causes, and developing preventive measures. Using this information as a basis, it establishes safety rules and revisions thereof, which in turn are passed on to divisions and regions for application. As a system office, the Safety Department establishes safety objectives, checks on the effectiveness of the administration of the safety program, and makes special studies and investigations pertaining to the interpretation, application, and enforcement of the safety rules. It supervises the filing of accident reports as required by the laws governing such reports.

That safety is considered an operating problem of major importance, along with train operation, material supplies, maintenance of plant and equipment, procurement of traffic, etc. is evidenced by the fact that its administration is the direct responsibility of the top ranking operating officers, the same men who conduct the primary business of railroading. Thus the highest talent on the railroad is employed in the discharge of the safety program. Each officer and supervisor answers for his own departmental, divisional or regional safety performance. The education of employees, stimulation of interest in safety, enforcement of rules, and record of performance are in the hands of the leaders of the industry.

Appraisal of the effectiveness of safety activities is based upon the principle of comparison between similar areas or types of operation. In 1935 this comparison was emphasized, and employee interest stimulated by the establishment of formal competition known as the President's Safety Contest. In this competition, regions were matched against regions, divisions against divisions, and division departments (maintenance of way, maintenance of equipment, station, freight and yard train service, engine service,

and passenger train service) against the same departments of other divisions for the coveted President's Certificate of Merit.

Everyone's in the Act

Participation of employees in promoting phases of the safety program is a custom of long standing. Employee divisional safety committees have been in existence since 1910, and have been augmented by departmental, shop, and yard groups. In addition to their constant vigilance over working conditions and work habits, the committees, joined by supervisors, discuss their findings at weekly and monthly meetings, and make recommendations to eliminate hazards, minimize the effects of accidents, and prevent their recurrence. Aside from their immediate duties of surveillance of conditions and practices, these committees have done much to encourage off-the-job safety work and arouse the interest of employees in such promotional work as staging rallies, conducting contests, developing safety poster ideas, and enlisting active cooperation in the overall program.

Employees have further opportunity to work for safety through the use of the Employees' Suggestion Plan, a system whereby employees may submit to a system office any ideas or suggestions they may feel are worthy of consideration for either local- or system-wide application. Although the Suggestion Plan is not limited to safety suggestions, it is an effective means whereby employees' suggestions get careful and confidential handling. All ideas are thoroughly studied by experts in the field of work involved, and if found practical, and adopted, cash awards are made to the employees submitting the ideas. Even in cases of rejection, detailed reasons are given the employee in a personal letter sent to his home address, and attempt is made to encourage his further use of the Plan.

As a guide for proper work practices, separate safety rule books, specially compiled for the work involved, are issued for station, maintenance, and operating departments, and each employee in those departments is supplied with his own copy, which he is required to understand and obey. Although there are thousands of safety rules in the full set of books, each one is carefully considered before being adopted, and in each case the rule is the outcome of either actual experience with recorded accidents or with well defined and recognized hazards.

Equipment Prevents Accidents

From the time a new employee enters the service of the company, and receives either classroom or individual instructions on safety from his employing officer, he is in constant contact with some evidence

Scrape off hard-caked grease and dirt ...scrub away dangerously slippery oil with this one powerful HILD Floor Machine! With Power-Scraper attachment the Hild Machine breaks up packed grease deposits...saves hours of tedious chipping away with a hand-spud. And, it's *so much easier* on your floors. No danger of marring the surface or of loosening wood blocks. To remove oil film or slippery grease, use the HILD Machine as a Shower-feed Scrubber. It's equally speedy and thorough in open areas and in the "danger spots"... around, beneath and between machines. Use the same versatile Hild Machine for office floors also...to wax, polish, buff, sand, grind or steel-wool floors of all kinds.

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Diagram shows how cleaning solution flows from tank on handle through accurately spaced holes penetrating brush back between each row of bristles ... for thorough scrubbing with utmost economy.
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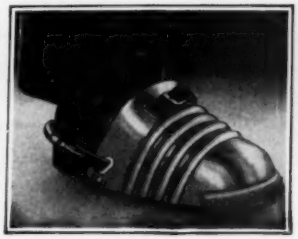
Sankey Foot, Toe and Shin Protective Equipment

Combination Foot-Shin Guard



Improved Foot Guard

Fibre Shin Guard

Are You Fully Protecting the Feet of Your Employees?

"SANKEY" FOOT GUARDS consist essentially of a metal shield to be worn over the shoe whenever the foot is in danger of being either crushed or cut. The metal shield is designed to furnish a maximum amount of protection to the entire front of the foot—not merely the toes alone, but also to the instep—against hazards from falling, rolling or flying objects, or from accidental tool blows.

For additional information write the

ELLWOOD SAFETY APPLIANCE COMPANY

221 SIXTH STREET **ELLWOOD CITY, PENNA.**

Please use # F-42 in requesting further details.

of the safety program. If his work calls for special protective equipment, he is supplied with necessary items of heat, acid or water repellent clothing as required. If his work involves eye hazards, the wearing of goggles is mandatory, and the company supplies goggles, fitted with prescription lenses to suit his own correction if his eyesight necessitates glasses. Hundreds of thousands of dollars have been spent on this one item of equipment alone with the result that serious eye injuries have been practically eliminated. The requirement to read and be familiar with a particular safety rule each day helps him to learn the contents of the entire book. He sees bulletin boards and safety posters in many prominent locations in shops, yards, and offices; and visual aids in the form of motion pictures and slides are used to further his education at meetings in one of the specially equipped safety cars or in an assembly hall. Most of the divisions have their own monthly safety publication which brings items of general interest along with an appropriate safety message to every employee.

While every effort is made to exercise eternal vigilance in present methods, and at the same time conduct a constant search for more effective measures, it is recognized that the greatest safeguard is the employee himself, trained in the idea of intelligent caution constantly exercised. So it is the aim of The Pennsylvania Railroad to makes its employees conscious of their personal responsibility for the safety of the public, their fellow workers, and themselves. To help accomplish this purpose, a new tool has recently been added to the list. The Supervisor's Training Program, conducted by The Extension Service of some of our large Universities, is an instruction course in human relations between supervisors and employees. Since safety is primarily a human relations problem, the improved skill and technique of supervisors in reaching an understanding with their men holds fair promise of making employees more disposed to work carefully and to safeguard operations so well that accidents will be reduced to a minimum.

While comparable records for the years prior to 1923 are not available, the improvement in employee safety performance since that date proves the effectiveness of The Pennsylvania Railroad's policy and practices. Injuries to employees have been reduced from a rate of 42.95 per million manhours in 1923 to 7.11 in 1950. The significance of these figures may readily be seen from an estimate of life and limb saved by that improvement. Had the 1923 rate continued over the intervening years to date, instead of the actual rates experienced, over 3700 more lives would have been lost, and well over half a million more serious injuries sustained.

Pictures by courtesy of The Pennsylvania Railroad.

Oak Ridge Symposium on Nuclear Engineering

THE 1951 Summer Symposium in the series sponsored annually by the Oak Ridge National Laboratory and the Oak Ridge Institute of Nuclear Studies will be held from August 27 to September 6.

Sessions in the 1951 symposium will be devoted to nuclear engineering, at the request of the American Society for Engineering Education. Representatives of interested industrial organizations are invited to join AEC personnel and representatives of educational institutions in discussion of basic nuclear engineering, general nuclear power "philosophy," applications of the engineering sciences to nuclear technology and the problems of nuclear engineering education.

Inquiries concerning participation in the symposium should be addressed to Dr. Russell S. Poor, Oak Ridge Institute of Nuclear Studies, P. O. Box 117, Oak Ridge, Tenn.

Safety is integrated directly with all types of training. Here, an engineer demonstrates proper procedure for starting centrifugal pump.

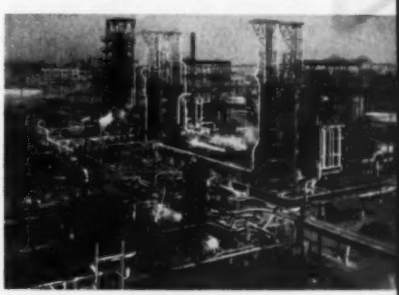
Each advance in refining techniques creates new problems.

ESSO CRACKS ITS SAFETY PROBLEMS

By **WILLIAM NADEN**
Vice President & Director
Esso Standard Oil Company

1. One of the early types of crude stills. A battery of low pressure stills of about 1911.

2. Pressure stills, with higher pressures and temperatures were second step in development.



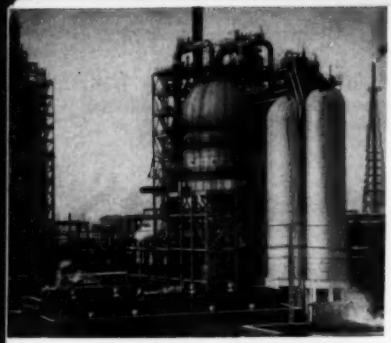
3. Cracking coils, the third stage, gave still higher pressures and temperatures and a continuous flow process. Note height and size.

OIL refining with Esso Standard Oil Company dates back about 75 years. In the early days oil refining was a batch operation. A refinery consisted of a large number of small batch stills which were charged with crude oil about once every three days and the products were then distilled off leaving a final residue of coke. This coke was removed by hand and the whole process was repeated. Soon after World War I, increased demand for petroleum products dictated the need for improved refining methods. New refining equipment had been developed utilizing higher pressure and a continuous flow of oil through the stills. These new high pressure stills, in addition to being larger and more efficient units than the shell stills, also permitted the manufacture of improved quality and a greater yield of product. The development of this new equipment also brought with it a completely new set of problems from a design, operating and safety standpoint.

At about the same time it became apparent to the management of our refineries that too many accidents were occurring to our workers. It was obvious that something should be done about it. Something was done—a safety policy was established. Management recognized its responsibility for safety and the policy was based on three factors—safety to the employees, safety of our equipment and safety of our neighbors.

The foundation of our formalized safety program consisted of the following parts:

1. The recognition by management of its responsibility to participate in safety, continuously and actively.
2. The establishment of a safety organization at each plant to assist management in fulfilling its safety responsibility.
3. The establishment of an engineering group to inspect refinery equipment to assure that it was in safe condition to operate.
4. The organization of a General Safety Committee to unify



4. Catalytic cracking units are actually safer than their predecessors despite their huge size.

our safety program.

This basic safety organization still prevails as the key to our safety program. It has been expanded and strengthened as changes in our refineries have indicated a need.

Early Activities & Results

The absense of machine guarding was one of the first obvious problems confronting our newly selected safety inspectors. Prior to the organization of our safety program, machine guarding was not considered either necessary or desirable by many of the "old timers." There was much resistance, criticism and ridicule to overcome before real progress was made. These early safety inspectors accepted their responsibility with enthusiasm and were not easily discouraged by the up-hill road ahead of them. Although progress was slow at first, results started to show up in improvement throughout the plants.

Scaffold accidents, while fortunately not very frequent, are usually quite serious. This problem was explored and resolved by the General Safety Committee as another of their early problems. At the time there was no standardized and complete information available so that the Committee developed their own standard. This early scaffold standard has since become obsolete because of the general use of prefabricated steel scaffolds.

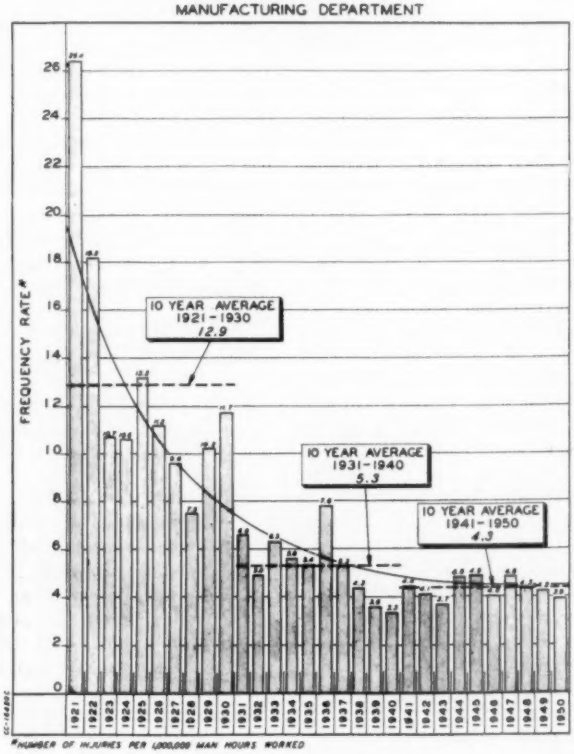
In addition to these two specialized problems and as a result of the toxic, fire and explosive characteristics of certain oils, there were other problems, such as:

1. Providing safety equipment.
2. Drafting an employee safety booklet.
3. Compiling general safety instructions.
4. Establishing rules for the handling of toxic oils and products.
5. Formulating rules and procedures for working about, on or in tanks.
6. Standardizing and establishing methods for the safe handling of chemicals.
7. Integrating and strengthening safety precautions in oil processing operations.

Refining Changes

You cannot consider an oil refinery safety program without recognizing the changes that take place in oil processing methods and their influence on the safety program. Our formalized safety program was inaugurated in part as a result of the first major change in processing methods. Since that time there have been many changes in oil refining methods with several major developments which have required, along with the growing demand of more and better oil products, much dismantling and reconstruction in our refineries. Since the start of our organized safety activities, there has been an important change or improvement in oil refining methods and processing equipment about each 10 years.

Each major change in processing methods and equipment brings with it new safety problems. Fortunately, however, we have accumulated much experience and know-


30 YEARS OF PROGRESS IN SAFETY
ESSO STANDARD OIL CO.
MANUFACTURING DEPARTMENT
FREQUENCY RATE*
10 YEAR AVERAGE 1921-1930 12.9
10 YEAR AVERAGE 1931-1940 5.3
10 YEAR AVERAGE 1941-1950 4.3
*NUMBER OF INJURIES PER 1,000,000 MAN HOURS WORKED

how that has contributed to the design of this new equipment, with the result that most new oil processing equipment is safer than the equipment that it replaces.

Several different groups have pooled their knowledge in the design of these new larger and more efficient processing units. In this respect, each of the following groups takes some pride and satisfaction in the performance of these new units: 1. Process Engineering, 2. Process Operation, 3. Mechanical Engineering, 4. Mechanical Maintenance, 5. Metallurgists, 6. Safety Inspection, 7. Personnel Safety.

In 1930 a Chief Safety Engineer was appointed from our Engineering Department. This position was established to coordinate and strengthen the domestic safety program in keeping with the changes that were taking place in our refineries and marketing facilities.

Current Safety Program

The current safety program continues the policy established by management over 30 years ago. It consists of:

1. An appropriately staffed safety division at each refinery whose primary responsibility is the personal safety of the employees. In each case the safety division is a part of the Employee Relations Department and will vary in number of personnel from 1 man part-time in the case of a small refinery, to a group of 16 men in the case of a large refinery.

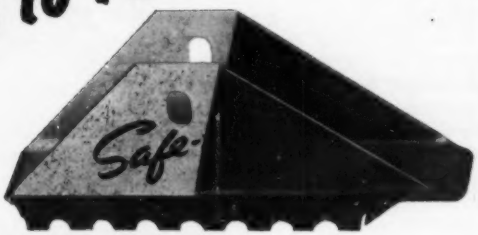
2. There is an equipment safety inspection group at each refinery ranging in size from 3 to 70 men. The primary responsibility of this group is the safety of the oil processing and storage equipment. These equipment safety inspection groups are under the coordinating supervision of the Chief Safety Engineer's Office.

3. The Chief Safety Engineer's Office is composed of a group of 9 persons. This group functions as a coordinating staff for the company's complete safety program, including problems of safety between the company and our neighbors, our customers and the public at large.

4. The General Safety Committee meets annually under the chairmanship of the Chief Safety Engineer. In addition to this committee, there are several other process, operations and mechanical committees that devote much time to safety problems.

The results of a safety program are usually not immediately obvious. In contrast, failures are obvious, even glaring at times. Real progress was made, though it was sometimes slow and beset by many discouraging experiences. It is inconceivable to visualize a large oil company operating today without an organized safety program. This is well proved by the oil industry representation, both foreign and domestic, in the Petroleum Section of the National Safety Council

Foes to Falls

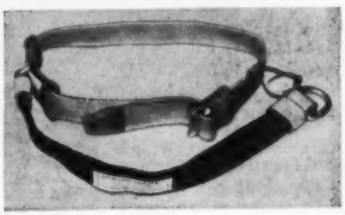


SAFE-HI Ladder Shoe...

...prevents ladders from slipping under ALL conditions of use: smooth dry surfaces...wet, slick surfaces...greasy, soapy surfaces...and in snow, ice or mud. Won't mar fine floors.

SAFE-HI Construction Worker's Belt...

...features Unolyn SHOCK ABSORBER... stops falling workman g-r-a-d-u-a-l-l-y instead of with sudden jolt. Prevents injuries to man, breakage of belt, life line, or anchorage.



See Your Safety Dealer or Write

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• SAFETY BELTS • LADDER SHOES
• POLE GRIPS • WALL GRIPS • CHISEL GRIPS
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and the active participation by a large number of companies in the American Petroleum Institute, Section on Safety and Fire Protection Services.

Interest in safety by executives of the oil industry is also shown by the number of them on the Safety Committee of the Board of Directors of the American Petroleum Institute. Our company has been represented on that committee and in these other activities for many years.

Statistics are drab and they tell only a part of the story, but it is an important part. You will observe from the accompanying chart that substantial progress was made in the early days of our organized safety effort. We have lost ground occasionally and the curve has flattened out. It requires greater activity now to keep the curve flattened out at a relatively low level than was required in the early days to show substantial progress.

Where Do We Go From Here

Time spent in the refinery is the safest part of our employee's day. Substantially more of our employees are injured "off the job" than are hurt at work. These "Off the job" accidents are, on the average, more serious than the "at work" cases. This is a challenging program—we are exploring it.

The automobile accident problem is well recognized. We are vitally concerned with it as it affects our customers, our employees and their families. We are in the midst of a Driver Training Program aimed to cover all company drivers, both regular full-time drivers and casual drivers. At some locations, this Driver Training Program is being extended to all employees.

Training is an important activity in our organized program of employee development and a portion of that program has always been devoted to safety.

Health Problems

The diversification of the petroleum refining industry has created many problems in the field of employee welfare and health. To cope with this problem we have recently enlarged our medical facilities and have added an industrial hygiene group.

In conclusion, organized safety is a "must" with Esso. It requires the active and continuous support and participation of both labor and management. As a result of this cooperation between labor and management, each of our refineries and many of our major departments have established commendable accident-free records. To mention two—one Esso refinery operated for 1008 days without a disabling injury and another of our refineries operated 5,048,400 manhours without a disabling injury. Still better records are in the making.

Pictures by courtesy of Esso Standard Oil Company.

Floor Maintenance

(Continued from page 59)

corridor; horseplay among personnel. All these factors contribute to a high rate of accidents. The remedy in each case is quite obvious: *Care.*

Rule Out Falls

To sum up, the following rules for protection of floors and personnel should be observed:

1. Replace badly worn, eroded floors.
2. Clear your supply room of ancient, unlabeled materials.
3. Don't buy cleaners and polishes on a basis of price alone. Cheap ones cost more in the long run. Your casualty insurance company will be glad to make recommendations.
4. Floors must do more than glisten like a Second Lieutenant's bars in order to make a good impression. They must provide safe footing, too. By all means, strive for cleanliness and high polish, but place prime emphasis on slip-resistance.
5. Avoid the idea that "what was good enough in the old days is good enough today." Improved products are now on the market. There may not have been such a thing as slip-resistant polishes in what you consider the "old days."
6. Know your floors. Learn what types of cleaning and polishing compounds are suitable for terrazzo, for asphalt tile, for linoleum, for wood, for magnesite, etc. Make sure your cleaning crews understand, too. There are organizations which send experts to make free, on-the-spot surveys of your floors; who tell your crews what products to use and how to use them. Ask such an expert to call on you.
7. Once you have instituted a system of maintenance which entirely satisfies you, stick with it.

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8. Instruct your crews to warn personnel by posting signs or other means while cleaning is taking place.
9. Keep walkways clear. Be sure crews keep equipment not in use well out of the way of traffic.

You will be surprised how quickly the accent on safety will pay dividends in appearance, production and economy as well.

Then and Now

(From page 29) designed to give illumination in mines, without a hazardous open flame. Its use for this purpose ended when Thomas A. Edison in 1915 invented the Edison Electric Cap Lamp, the first permissible miner's light.

This first Edison lamp, the Model C, was rated at 3 candle power, a marked improvement over the ½ candle power of the Davy lamp. The Model E, approved in 1923, doubled this rating and in 1928 further improvements increased the power of the Model H six times to a candle power rating of 36. Steady development work resulted in the Model K in 1931 with 70 candle power, followed by the Model P in 1940 with 200 candle power, and finally the present Model R4 with its 240 candle power. Mechanical improvements and design refinements advanced along with the increasing candlepower.

The flame safety lamp's utility as a safety instrument continued—it was employed to test for oxygen deficiency and as a detector for hazardous gas common in coal mines. It has been improved continually over the years and today is still a valuable safety tool. However, research has resulted in the development of a more accurate method of detecting methane gas and precisely measuring the concentrations present in given amounts of atmosphere. Going a step beyond these portable methane detectors, a methane alarm has been devised. It continuously tests the atmosphere at the working face of a mine (valuable in today's high speed mining operations) and automatically warns either audibly or visibly when methane gas concentrations reach a predetermined limit. Thus, science is leaving little to chance in its untiring struggle to make men safer on their jobs.

Improved Respiratory Protection

In the early days of safety, all breathing apparatus used for mine rescue and recovery operations had been imported from Great Britain and had one common fault. They employed a fixed flow rate which didn't compensate for changes in the work level or breathing rate. The first American self-contained breathing apparatus was "lung governed" and automatically compensated for these factors.

Today, improved models of this apparatus are standard equipment throughout mining and industry. In addition to this continued process of improvement, research

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scientists struck out on entirely new paths which resulted in the startling development of a breathing apparatus that generates its own supply of oxygen from the contents of a small chemical canister. Originally perfected for the U. S. Navy during the last war and now standard equipment aboard ships of the fleet for fire fighting and damage control operation, this oyxgen-generating apparatus has been accepted widely both by fire departments and industry, in general because of its light weight, compact size, ease of operation and minimum of maintenance.

One of the early problems confronting safety pioneers was the revival of persons overcome by gas. About 1915 a device was developed for this purpose which administered oxygen and required artificial respiration, thereby supplanting lungmotors and pulmotors which some medical authorities agreed could be harmful. One resuscitation apparatus consisted of a mechanical rocker that simulated manual artificial respiration, while oxygen was administered to the victim by an inhalator. Use of manual artificial respiration methods along with an inhalator led to the training of thousands of persons by the Red Cross, Boy Scouts and others in this method. Numerous lives have been saved as a result of such training.

Improvement of life-saving apparatus has been steady. Probably the most significant development was fostered by the wartime necessity of administering artificial respiration to bomber crew members. Quarters were cramped and other members of the crew could leave their posts for only a limited time. The Aero Medical Laboratories at Wright Field found the answer to this problem in a specially developed automatic cycling valve small enough to fit in the palm of the hand. This valve is now the heart of a series of medical instruments for automatic artificial respiration and oxygen therapy, the latest of which is a portable model for the use of fire departments and industry in general.

From the bulk first aid supplies first marketed have evolved today's modern individually packaged treatments, more sterile and easier to apply. Improvements in materials and design have resulted in sturdy weatherproof containers that can be stored indefinitely out-of-doors or in an underground mine.

Shape of Things to Come

It is safe to say that the last fifty years has seen more significant accomplishments in the field of safety than all the preceding centuries. In the mining field, much has been done since the early miner entered the pit mouth with his working tools and his dinner pail and toiled long hours in damp, poorly ventilated workings, lighted only by the flickering flame of an open light.

Today's miner rides speedily and safely to his job in specially designed mantrip cars. Before his arrival, his working-place has been tested for proper ventilation and concentrations of gas. A powerfully beamed electric cap lamp mounted on his sturdy protective hat provides him with a plentiful supply of light which can be changed by a simple adjustment from a spotlight beam to a clear, spreading floodlight. He wears safety shoes, goggles and protective clothing of many designs. The environment in which he works has been made as safe as possible. **Rock dust has** been applied right up to the working face to thwart the force of any explosion. The roof above him, which so often threatened earlier miners with entrapment under tons of falling rock and slate, is tested constantly and held in place by new and ever-improving methods of support. The electrical equipment he uses must meet rigid specifications. In fact, the very safety equipment he is wearing has passed rigid tests established by the U. S. Bureau of Mines.

Safety is no longer the personal and often neglected concern of the individual. It is the common cause of management and the workman, with management, of necessity, taking the lead in establishing new safeguards and seeing that proper safety equipment is acquired and used properly on the job.

The results of this modern crusade for safety are reflected in the notable decline in occupational accident statistics. Still, much has to be done. The crusade must be relentless in its search to find ways of protecting man from the inherent dangers of his environment. Our organization, with its manufacturing facilities and its new safety equipment research center, The John T. Ryan Memorial Laboratory, is pledged to do its full share in this common cause by continuing to develop and supply the safeguards needed to help men work and live in safety.

Pictures by courtesy of Mine Safety Appliances Co.

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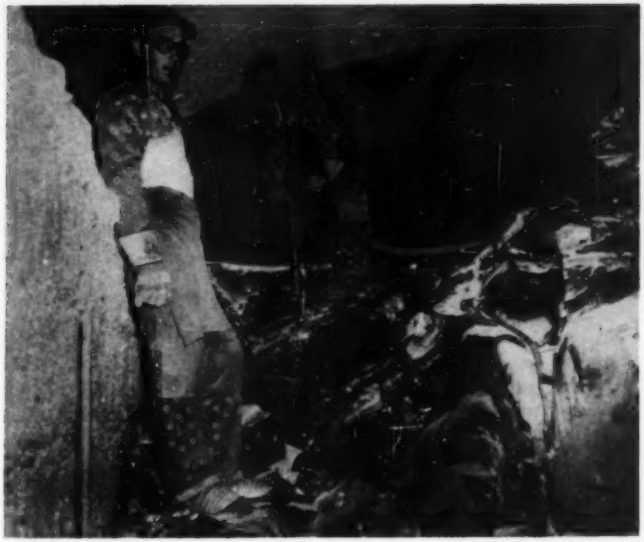
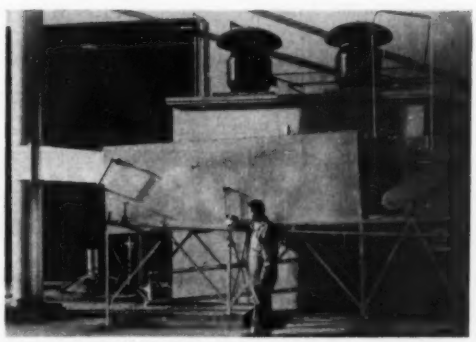
By THOMAS R. DONOGHUE
Director of Safety
Pittsburgh Plate Glass Company



Special equipment for glass tank repairmen provides ample protection against the sharp broken or refuse glass necessary to the batch. Note goggles, sleeves, gloves, aprons, leggings and shoe caps.

Successful Safety Planning

In any diversified industry, hazards are multiplied many times, and therefore company-wide planning becomes necessary to maintain the welfare of personnel.



Employee welfare is evident at all new as well as old Pittsburgh Plate Glass operations. Here, at the new Torrance, Cal., paint plant, is fume disposal system used in varnish cooking operations.

WE HAVE been fortunate at Pittsburgh Plate Glass Company in that our top management has not only voiced but has always taken an active interest in promoting safety practices for employee welfare from our top manufacturing units all the way down to our end-products distributors. Like all good things, of course, our safety program was slow in reaching the closely interknit full-scale operation we have today.

We have been affiliated with the National Safety Council since 1916 but our broad formalized program first took shape at our Crystal City, Mo., plant in 1921 when we inaugurated our safety committee system which consisted of a general committee of top management personnel and departmental committees which met in regularly scheduled sessions.

From this nucleus was devised the broad safety pattern that is followed in most of our plants today—diversified manufacturing

units of the glass, paint, chemical brush and coal divisions.

In each plant of these divisions we have a safety organization supervised by a centrally controlled program. The general safety pattern and the scope of coverage for each plant is determined by the size and type of operation involved. From a mere handful in 1919, we now have 38 safety organizations with employees covered by each, varying in number from 50 to 4,000.

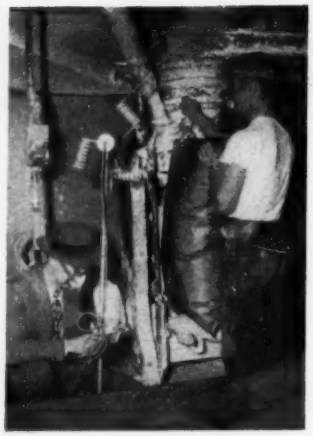
Specialized Protection

Our safety program includes protection of employees from accidental injuries, from occupational disease exposures and plant protection against fire and other hazards.

In each of our manufacturing units the program is designed to cover the exposures of the particular processes involved and to afford maximum protection to exposures which cannot be guarded against mechanically by furnishing the very newest and best in protection clothing and equipment.

Through the years Pittsburgh Plate Glass Company has shown safety leadership by developing a major part of its body protective equipment which it has especially designed to cope with the exposures encountered in the handling of glass and other hazardous operations.

In our paint and chemical divisions we deal with organic and inorganic compounds and exposures to solvents, insecticides, lead and numerous other toxic materials, requiring the use of body protective and special respiratory equipment.



Checking dust concentration in the packing department of Columbia Chemical Division, Barberton, Ohio, is a regular precaution. Note both men are wearing dust respirators.

Special clothing was designed to limit exposures of employees handling glass. The metal rings prevent slashes from sharp edges and provide ventilation for greater comfort.

Our mining operations include coal mines, limestone mines and silica sand mines and an outstanding contribution to safety in mining has been made by some of these organizations.

Fire brigades are organized and trained in each plant not only for fire duties but also to perform in emergency brigade capacities.

Merely organizing safety committees is, of course, not of itself enough to provide a satisfactory safety program. The committees must function and they must have the utmost cooperation both from a management and employee standpoint. In addition every effort must be made to constantly promote the "live, think and act safety" theme to the individual.

Visual aids, guidance programs and complete counseling service are always available in the safety parcel at each Pittsburgh Plant.

All of our larger organizations have full time safety engineers on the job to supervise safety and fire protection activities. In the smaller units, safety is a major charge of the personnel man in charge of all industrial relations activities.

In a diversified industrial family such as ours there is always the problem of expansion. Our policy is that as soon as a new organization has been brought into the Company, safety is immediately stressed, a program formulated and as quickly as possible safety is made a primary part of daily operations.

How successful this program has been may best be cited by going back about 30 years to the time immediately before our accelerated safety program. In 1919 with 10 operations covering 16,000,000 man-hours, our frequency rate for disabling accidents was 60.00 per million hours worked. In 1950, with 38 operations, totaling 44,000,000 hours worked, a new low

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for the company of 6.30 disabling accidents per million was established. It is interesting to note that we are approximately 40 per cent lower than the "all-industry" rate of the National Safety Council and 60 per cent lower than the "all-manufacturing" rate of the United States Department of Labor.

In summation it might be stated that four major factors are responsible for the successful operation of our safety program. These are:

1. The ultimate in cooperation from our top management—active interest and participation in company, divisional or plant activities. Top management's voiced interest is essential for successful safety planning.

2. A sane, solid, common sense approach to the safety problems peculiar to each of our individual operations and a never-ending campaign against unsafe practices and procedures.

3. Supervisors' interest and promotion of the safety program. Foreman's instructing and training employees in safety methods and practices and stimulating employee thinking on safe operation.

4. The real interest and cooperation of employees without which no safety campaign, however cleverly devised, can hope to succeed. It is through the splendid interest and cooperation which our employees have extended that our units have been able to show a continual reduction in injuries through the years and, in many instances, it has been primarily this interest and cooperation which has enabled us to establish long periods without lost time injuries to mar the record.

The Pittsburgh Plate Glass Company safety and fire protection activities have expanded through the years as has the company. The safety operation will continue to expand as the need occurs with every effort being made to assure the ultimate in welfare and personal safety to every employee in its far-flung operations.

Pictures by courtesy of the Pittsburgh Plate Glass Co.

Loss Prevention

(Continued from page 41)

we group our service activities under the headings of manufacturing (industrial establishments or plants), stevedoring (handling ship's cargo), construction (contracting operations with no permanent installation), commercial (large stores, hotels and restaurants), fleet (local delivery vehicles), and motor transports (long-haul vehicle operations). These are divisions, by type of business, made necessary to create specialized service of significant value. We have also found it desirable to develop specialized skills that require particularly unique talent or experience for the handling of particular types of problems occur-

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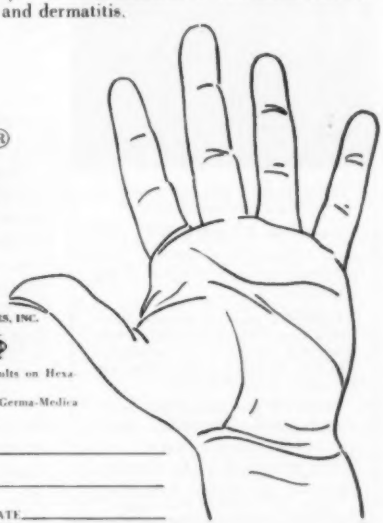

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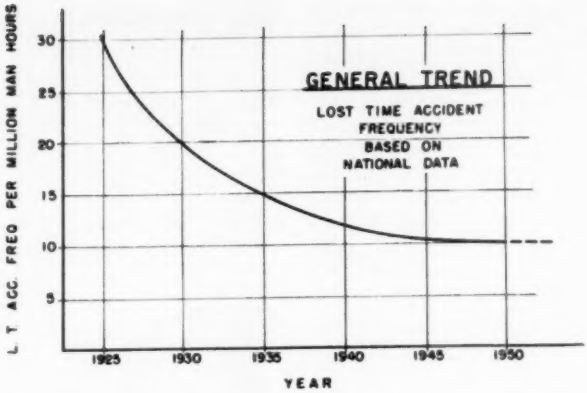
ring in all categories of business. At present, we have personnel devoting their full capacities to the particular specialized professions of Industrial Hygiene, Elevator Inspection, Traffic and Vehicle Control, Machine Guarding, Sound Slide Film Development, Public Liability, Group Accident and Health. We feel that we are doing the conventional things well. But, in addition, we began to employ, eight years ago, a field staff of industrial physicians and registered nurses to work, in collaboration with our safety engineers, on the prevention of certain types of accidents that were beginning to prove troublesome. These people also began to stress the quality of medical care and the rapid convalescense of the disabled employee.

Typical puzzling problems, such as the strain that appeared to be the result of lifting light loads and falls of persons, seemed to have no engineering answer. We also began to get positive clues to what, then, appeared to be the possibility that the health of the employee was making a direct contribution to the causes of many industrial accidents.



Not All Workers "Average"

Why are we finding that conventional safety engineering is not producing substantial further results in many establishments? In the early years, safety engineering consisted of the simple process of inspecting for and removing obvious physical hazards, such as unguarded belts and gears, the absense of handrails, etc. During later years, the safety engineer applied broader engineering procedures that created safe work environments and work stations. He applied various forms of job analysis and educational techniques. He established best work methods. He corrected many of the old original hazards through machine guarding, improved layouts, committees, and recognition of the part that the executive, the supervisor, and the employee could contribute to accident prevention.

But now we find that many of these former hazards have been eliminated by improved conditions that we accept as a matter of course. Many machines and much equipment now come from the manufacturer already equipped with guards; good housekeeping is oftentimes the rule rather than the exception, etc. Most important, the routine designs and specifications applied by the safety engineer produce tools and methods for use by employees possessing *average* physical qualifications. We have found that the exclusively engineering and educational approach has frequently become inadequate, for the surprisingly simple reason that the people using these working conditions, equipment, and methods are *not*, in all cases, individuals who possess average physical qualifications.

The Unholy Combination

Accidents are still caused by unfortunate combinations of machines, equipment, methods, material, and the man himself. The safety engineer is able to go only so far with machine guarding and with altering methods, because production standards must be maintained. Very seldom can material be processed or handled under ideal loss-prevention conditions. That leaves us with the employee himself. In the past we have not paid enough attention to the contribution that the employee can make or does make to the occurrence of an accident

More specifically, we find that some industries and many individual industrial and business establishments have reduced their frequency of disabling injuries to the

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extent that they are fluctuating within a narrow range under 10. The original accident-prevention techniques are still making their contributions, but they are not making any further sensational improvements as they did during the period of about thirty years following 1912. (See Chart) We have entered a leveling off period in which the exclusive use of past methods produces little if any improvement. *We do not admit that these present low frequencies are "irreducible minima"*— nor do we remain passive because answers to the new challenges are not immediately at hand. We rather believe that *the most difficult part of our industrial accident-prevention problem remains to be solved.* That problem, in many respects, is a new one. It consists of finding out how best to reach the individual worker with measures which will enable him to make his maximum contribution to accident prevention. The specific problem is further made evident when we find that the preponderance of accidents in these low accident-frequency establishments are, in large part or entirely, due to *personal* causes. These personal causes include body incapacity, improper placement, lack of adjustment to the job, and emotional upsets—all of which cause not only accidents but also other productive ineffectiveness.

Actually, if we were better safety engineers, we should be able to design guards for machinery, devise methods, and develop material modifications so that it would be virtually impossible for an employee to get hurt. Unfortunately, the safety engineer is not that good, and all the other previously well-known preventive contributions are not sufficient to do a complete job of loss prevention, if the man himself is ignored.

Well Adjusted Have Few Accidents

It is common knowledge that there are both direct and indirect approaches to accident prevention. One indirect approach stems from our knowledge that the physical well-being, the satisfaction, the contentment that an employee experiences in both his home and occupational life has a bearing on his accident record. Briefly, if an employee is personally well adjusted, he will have fewer accidents. This leads us to our present emphasis on efforts to increase the effectiveness of the individual employee.

By the effectiveness of the individual employee we mean the ability of an employee to perform his particular work well, without harm to himself or others, and to live well in the environment outside his place of work. We prefer to use the term "individual effectiveness" rather than "health" because the word "health" has been abused. Our concept of health must be tied in with a man's work. If he has the physical capacity to live and work effectively, he can be said to have good health.

We may further define individ-

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ual effectiveness, as an accident prevention technique, as the summation of all the factors that affect an individual's capacity to work.

Enlarge the Horizon

The safety engineer must enlarge his horizon to encompass any and all hazards especially those which threaten *any phase* of the physical well-being of the employee. This thinking then moves us to call on the specialized knowledge of industrial medicine—the industrial physician and the industrial nurse. Modern industrial medicine emphasizes *preventive* rather than curative techniques. This new emphasis, in collaboration with well-known engineering safety methods, gives us what we think is a solution to this problem of increasing the effectiveness of the individual worker.

To assist in projecting our thinking along these lines here is an example—perhaps an extreme one—but, nevertheless, typical of improved effectiveness of an individual:

In one of our plants there was a man who had been operating a machine for eighteen years without any accident, but this particular morning he cut off two fingers on his right hand. Upon investigation we found there was no failure of the machine, method, or design of the guard. In questioning the man, it finally developed that his daughter, who was a spastic, had developed a serious cold, and the night previously he had had to call the doctor. The man stated that during the incident he started to think that perhaps the child would be better off dead because she was such a problem to everyone and so unhappy herself. The next morning he came to work and had the accident. The plant doctor told the man about a special clinic to which the child could be referred and assured him that he personally would speak to the specialist and see what could be done. The man replied, "You know, Doc, if I had seen you yesterday, I wouldn't have cut off my fingers today." This is an in-plant, on-the-job accident but the cause was an off-the-job situation. You cannot separate them.

Off-the-Job Causes

In a much less dramatic manner such individual dislocations are turning up as contributing factors in many of our every-day accidents. An employee may have vision just good enough to get by; hearing barely acute enough to understand; a circulatory condition serious enough to cause occasional dizziness or, if you will, an arthritic condition which causes awkward and painful manual motions. None of these were caused by on-the-job conditions. However, they *do* cause on-the-job accidents and will continue to do so if nothing is done to correct or compensate for them.

Industry is realizing this situation more than ever before. One example will indicate that we seem to have found something effective to do about it. The brief story involves older workers and shows how age can contribute to accident occurrence.

Recently, in New England, we found a printing plant that was noteworthy in regard to physical conditions and the attitude of management. It also had one of the best industrial relations programs possible. In fact, it was so good that there was practically no labor turn-over. Yet there was an unusual number of serious accidents. The plant had started in business fifty years ago and most of the people they had originally hired were still with them. The large printing machines that were used were the same and the methods also had not been changed; but the men themselves, operating those machines, had experienced considerable change. One of the men was 72 years old, another was 70 and quite a few were 68. While the jobs stayed the same, the men had changed; and this change was due to experience that might be described as off-the-job. No attempt had been made to enable those men, as individuals, by medical process, to fit themselves better for the operating procedures in the plant. This example shows that if we want to keep these trained men—and we should—the operations should be revised, and, at the same time, we should, in some way, encourage the physical ability of these men to match the jobs. These 70-year-old men should not be allowed to climb up and down on the gear hubs and frames of the presses. If they must go to the top of the presses, they should have stairways or ladders where necessary and perhaps, in the case of an emergency, a few cushions. To finish this story, when the operations were re-designed to take into account that the bright young fellows they had hired 50 years ago had undergone physical changes, the unusual number of serious accidents were materially reduced.

With respect to the general prob-

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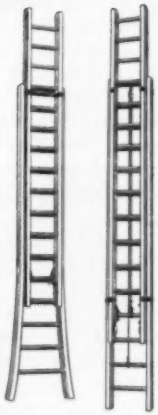

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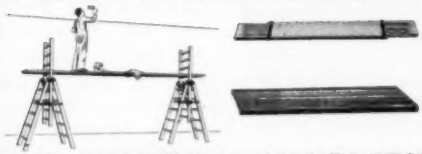

BLUE RIBBON LINE

THE GOSHEN MANUFACTURING COMPANY, GOSHEN, IND.

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lem of aging employees, our preventive philosophy consists of (1) developing positive health in the working force so that the employee does not become ill, is able to enjoy life, work at best efficiency and thereby, as a by-product, have fewer accidents; (2) preventing those physical conditions that are present or may develop, due to aging, from becoming disabling in terms of reduced efficiency; and (3) when the accident does happen, shortening considerably his disabling period or absence from work by having already improved the physical condition of the older worker.

Industry cannot be expected to solve all the problems that cause on-the-job accidents due to off-the-job situations; but on-the-job accidents are both tragic and costly. Industry can and is making a considerable contribution to their prevention. This might vary all the way from a kind word to a disturbed worker to a medical referral to a hospital for a serious, urgent illness which if ignored might cause a serious injury as well as other operating inefficiencies.

I believe that the limit as far as industrial management is concerned is to remember that they are not supposed to solve the problem, but that they are supposed to help the man to solve his own problem; they are supposed to direct their people to those who can help them. Industry can make the local contacts with neighborhood agencies and provide some of their own people, who have the capacity, to assist in some of the many problems that face individuals. Leave it to each employee to determine when he wants to take advantage of this offer of assistance.

Job-Born Ulcers

In other words, we believe that our present loss prevention problem is not solely confined to the employee's working hours. The problem necessarily involves the whole man and it is this man, in his total environment, that we must try to reach. The doctors use the term "psychosomatic medicine" which indicates the modern medical approach to the evaluation and treatment of the whole man. They mean by this term that you cannot, for example, separate a stomach ulcer and treat it apart from the man's energy drives and mental tensions any more than you can separate an emotionally-induced stomach disorder from the much-maligned mother-in-law who might very well be the cause of it.

There used to be a saying that "A man brings his wife to work with him" and, of course, by the same token, the man takes his work home to his family. There are probably few people who are able to avoid doing this either in whole or in part. Also, it is a well-known fact that individuals who are poorly fed, poorly housed, and harassed by anxiety eventually become physi-

cally and mentally unsatisfactory for effective work and this contributes greatly to accident causation. I think it is also true that work satisfaction is very important in counteracting such conditions.

That we have sensed the growing importance of these human factors among accident causes explains why we have expanded and supplemented our safety engineering and industrial hygiene efforts. We have been investigating what might be done to assist our policyholders in improving the conservation of manpower. During this period, thousands of large and small plants were studied, and we have quite a number of success stories and a fairly good pattern of performance. This has helped to interest management in all kinds and sizes of in-plant medical programs. Each one is geared to the particular problem of the particular establishment. Hundreds of such programs have been put into effect and we can say that once having started, no industry has ever given them up. The reaction of labor and management has been very favorable. These are not philanthropic measures, they are real investments that pay off in immeasurable good for the employees.

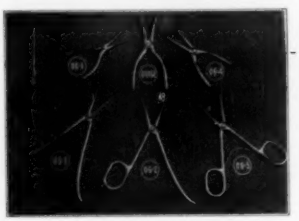
Concerted Effort Needed

Today we are facing a national emergency production situation. To make our best contribution in helping to solve it, we must broaden our concept of loss prevention to include the work of safety engineers, hygienists, production people, industrial physicians, and nurses working as a team. I believe that the concerted effort of this team will produce further results especially in industries and individual establishments whose accident frequencies are fluctuating below the average.

Primarily, the contribution to loss prevention by medical people is as fact finders to point out to us the physical qualifications of the individual employee. It is then up to the engineers and to management to make adjustments so that the individual may work without accident. In some cases, the medical profession can make the adjustment in the man to better fit the job; but I have the definite feeling that, for example, in a heart or a circulatory condition in an older worker, a job adjustment made by a safety engineer would be more important to the health and to the accident-prevention problem of the individual employee than all the pills in the drugstore. Today we need a broadening of our loss prevention philosophy, a better understanding of our overall problems, and a greater use of all the skills that can help bring about a more thorough control of accidents through the improvement and conservation of the individual effectiveness of each employee in industry and business.

Chart by courtesy of Liberty Mutual Insurance Company.

Fingers are precious!



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The Future Shows

Chicago, Ill.

June 5–7. Twenty-eighth Annual Midwest Safety Conference. (Congress Hotel). Joseph F. Stech, mgr., Greater Chicago Safety Council, 10 N. Clark St., Chicago 2, Ill.

Salt Lake City, Utah

June 21–23. Thirteenth Annual Western States Safety Conference. Marion A. Snow, exec. dir., Utah Safety Council, State Capital Bldg., Salt Lake City, Utah.

York Harbor, Me.

September 6–7. Twenty-fourth Annual Maine State Safety Conference & Exhibit. (Marshall House). Arthur F. Minchin, secretary, Maine Safety Conference, Dept. of Labor & Industry, State House, Augusta, Me.

Chicago, Ill.

October 8–12. Thirty-ninth Annual National Safety Congress and Exposition. (Stevens Hotel). R. L. Forney, gen. sec., National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

San Francisco, Calif.

October 29–November 2. Seventy-ninth Annual Meeting American Public Health Association. (Civic Auditorium) Dr. R. M. Atwater, executive secretary, American Public Health Assoc., 1790 Broadway, New York 19, N. Y.

What's New?

See pages 134–135

Free Bulletins

See page 133

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Bell's On Its Toes

(From page 26) been found most successful in companies with the best safety records. The fundamentals of the present-day safety program are "(a) impress on every individual his responsibility for his own safety, and (b) impress on every level of supervision their responsibility for the safety of their people."

Ready for the Unexpected

First-aid training was introduced in the Bell System almost 40 years ago with the assistance and cooperation of the American Red Cross. Since that time, thousands of telephone men and women have demonstrated their ability to lessen suffering and render practical assistance in case of accident or sudden illness. Recognition of the more outstanding instances where first-aid and proper job training have enabled telephone workers to help save lives is regularly accorded through the Theodore N. Vail awards.

Vail was the first president of the American Telephone and Telegraph Company and an early exponent of the responsibility of public service in the industry. A Bell System fund was set up in 1920 as a memorial to Vail with cash awards and medals to telephone people who performed acts above and beyond the call of duty.

One of the conditions for qualifying for a Vail Award is that the act of service shall be accomplished through knowledge and skills gained as a result of telephone work. Since the Vail fund was established, 1,382 medals have been awarded.

Within the last few months, first-aid training programs have been accelerated so that telephone people will be able to render aid in the event of an enemy attack. During World War II, civilian defense organizations and Red Cross chapters had thousands of telephone people in their ranks as first-aid instructors. In the present national emergency, telephone employees once again are forming an important part of such organizations.

Safety in Action

Making each supervisor definitely responsible for developing and training the personnel in his organization gives impetus to safe and effective production. The functioning of this policy has paid dividends in the form of fewer accidents. Such training and development procedures have convinced the personnel that accident prevention is not an abstract part of the job and that *safety and efficiency are inseparable.*

So that unsafe practices and their underlying causes can be determined and corrective measures taken to eliminate them, we make wide use of a safety observation plan. First and second levels of supervision, staff people and others make regular observations of work in progress. The adherence to safe operating is noted and the practices themselves studied to see if they are adequate. Results of safety ob-

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Properly guarded manholes on busy streets and highways add to the safety of men splicing underground cables. Signs and flags warn motorists away from the maintenance operations.

A typical January ice storm showing motor vehicle driving hazards and need for a careful survey of tree- pole and electric power hazards before crew can start repair work.

servations are summarized and form a basis for putting safety on a preventive rather than a corrective basis.

All Bell companies have routines for reporting unsafe plant conditions. Everyone in the business is encouraged to report broken tools, rotted poles, power wire exposures, damaged tires, corroded wire, faulty equipment, and similar accident-prone situations. It is the stated policy of the Bell System companies to provide tools, materials, and equipment which is safe when used with reasonable skill and care. Every effort is made to design plants that may be constructed and maintained without risk of accident.

Safety En Route

Some 55,000 trucks and motor vehicles are operated. The handling of these vehicles along with winches, derricks, pole-hole diggers, trailers, cable plows, tractors and other heavy power equipment presents a substantial exposure to accidents. With the growth in traffic on the country's streets and highways, the operation of all this equipment has become more difficult. The problem of building safe-driving habits in those who handle this equipment has become increasingly important.

Special emphasis is therefore placed on such things as (1) selection and training of drivers, (2) creating driver interest by special award plans, (3) study and effective use of safety observations and accident data, (4) modern maintenance methods, (5) safe design and use of equipment, (6) supervision, and (7) prompt attention to factors affecting a driver's ability to be safe.

In the final analysis, the success of the motor vehicle safety program rests in the hands of the 75,000 regular and occasional operators of motor vehicle equipment. That is the reason safety programs are designed to utilize every possible educational method to develop in each driver an understanding of the techniques of safe driving and to make him feel his responsibilities to himself, his company, the pedestrian, and other users of the highways.

Safety Reports

Comparative reports on all types of accidents are issued periodically. These keep everyone informed as to the causes of accidents and serve to stimulate interest and friendly rivalry.

One of the most helpful of such publications is the monthly "How Plant Men Are Injured." This illustrated report contains detailed descriptions of the more significant accidents which are discussed with men performing similar work. This report is widely used, 25,000 copies a month now being distributed. Information for the report is furnished by all the Bell companies, illustrating the cooperative endeavor throughout the System to help all employees avoid injuries.

Long View Essential

Spasmodic safety campaigns are, at best, only temporarily effective. A long-range program is necessary in order to achieve lasting results. A well-balanced safety program

Safety and Service Emblems

Fewer accidents mean more man-power. Safety Emblems for various lengths of "no lost time" service instill the competitive spirit so necessary for employee cooperation.

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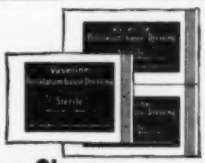

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should combine the long-range approach with a short-range attack that may be changed to meet new conditions. The various projects that make up the safety program can, as a whole, be planned and scheduled in advance the same as other activities in the business are scheduled.

There are, of course, many safety tools or "professional aids" which may be used in developing interest and a receptive attitude toward safety. The use of statistics, motion pictures, film strips, safety bulletins, posters, meetings, safety award plans, pre-job analysis, safety observation plan, and model equipment are but a few.

The variation in the extent to which management people of all levels recognize their safety responsibilities has a similar varying effect upon the safety record. *It is the "acceptance of responsibility" which is the key to improved safety. Responsibility for safety must be fully accepted by everyone from the president of the company down through the lines of organization to the last person.*

Telephone lines of the Bell System stretch throughout the nation, linking cities and towns and entering distant farmhouses, urban homes, apartments, stores, offices, factories—every type of dwelling and business structure. Over vital communication facilities telephone men and women stand guard 24 hours a day. They are prepared to expand or repair the telephone network at a moment's notice and in all kinds of weather.

That telephone work is performed day by day with an outstanding record of accident prevention is largely due to a safety policy based on an awareness of the tragedy of injured victims and of the economic loss to industry and the individuals when accidents do occur. It is obvious, however, that this policy could not become a definite part of every practice and of every job without the full cooperation of all telephone men and women.

Telephone men and women are safe workers because *they have come to know that safety in their daily life makes sense,* not only on the job but in the home and on the streets. We have learned that by doing things the safe way, all are the gainers—not only ourselves as individuals, but telephone users, the owners of the business, and the public at large.

Pictures by courtesy of American Telephone and Telegraph Company.

Safety Is Dynamic

(From page 19) on moving belts, walkways on cranes, substituted stairways for ladders, and eliminated or guarded set screws projecting from revolving machinery, while at the same time instructing employees in safe practices and in the proper use of safety equipment.

Later, personal contact between

the steelworker and his supervisor was established and after many years of experience has achieved great results. Every employee learns what progress he and his fellow workers are making. He knows whether the record for this month is better or worse than last month's, and the worker is encouraged by his foreman to make suggestions for the improvement of the plant's safety methods. Organized safety committees now reach through all of U. S. Steel's operating companies. Each plant has a general safety committee and each company has a safety advisory committee. The U. S. Steel's Safety Advisory Committee represents all the subsidiary companies and is composed of safety supervisors from representative companies, acting in an advisory capacity on policy and procedure. All these committees, from the smallest to the largest, meet frequently to sift ideas for improving the many safety practices which have been developed since the first organized group met nearly fifty years ago.

Over the years, U. S. Steel has found that education offers the greatest opportunity to improve safety records. Today it has taken its place alongside engineering and enforcement as one of the cornerstones of accident prevention.

Education should not be confined to posters and organizational campaigns, however. On the contrary, it should be visualized in its true perspective, namely, as job training, or on-the-job instruction. We have found, too, that education should extend into the home, as well. It must reach beyond the plant if it is to be effective.

The Single Objective

In the manufacturing division of the United States Steel Company, the group of men responsible for the company's safety program observed that during a recent period of about seven years there was little improvement in the overall accident picture even though the company's frequency and severity rates were well below the industry level. Just as the earlier safety supervisors had done, they set about learning why. They immediately dismissed from their minds the fact that the plants had enough protective devices, such as guard rails, safety lanes, signs, and countless other pieces of equipmen. They also discounted the fact that they were resorting to almost every known method for making the employees safety conscious through training and all types of literature, posters, and frequent meetings.

They went about the job with as fresh an approach as possible, and finally developed the program which is now known throughout U. S. Steel as "Single Objective Safety." Safety engineers compiled a list of accident statistics covering 27 months' experience in one department. Records indicated that minor accidents constituted 99 per cent of the total number. Few injuries were traceable to improper design, maintenance, use of equipment, or lack of protective devices. Therefore, the safety engineers focused attention on individual actions which could be responsible for an accident.

To discover such actions, the Single Objective Safety program analyzes jobs by breaking them down into their component parts and then pinpointing the specific act or acts which produce accidents. All these facts are tabulated on an "awareness chart" which clearly reveals the frequency of accidents in any particular job. The occupations with the highest frequency are quickly spotlighted for immediate action.

These charts have indicated that a relatively few occupations account for a large percentage of injuries. For instance, in one of our mills, only six of the 47 jobs in one particular area accounted for 73 per cent of the injuries occurring in that area. In another, five of the 13 occupations accounted for 77 per cent of the injuries. Examples such as these present striking proof that industrial safety efforts need not be aimless.

Instilling the Safety Story Early

But industry alone cannot accomplish the broad problem of safety. Too many people are injured outside of plants and mills, and many people are injured within a plant because they have acquired poor working habits in their early training. Lessons learned at an early age are generally carried through life, and it was upon this premise that another program of safety education was developed by United States Steel Company. It is a program which originally was intended for schools in the communities where the company has operations.

Vocational instructors in both Pittsburgh and Gary, Indiana, offered much friendly and constructive help in this venture which resulted in the "Safety in the Woodshop" program. Woodshops were chosen because nearly all schools

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provide instruction in woodworking. The program, which was developed in careful detail and with considerable imagination, provides a manual for both student and instructor, as well as a strip film which can be used to illustrate the proper handling of woodworking tools. "Safety in the Woodshop" has been presented to educators in several cities with such success that more than 100,000 copies of the manuals have been distributed throughout the country. U. S. Steel feels that the effect of this broad educational program will eventually be felt not only among its employees but also among the residents of the communities where its plants are located.

Steel's Safety Progress

Progress made by the steel industry during the past 50 years in the development of industrial safety would amaze early steelworkers. They would find it difficult to believe that a steelworker is safer on his job than in his home. But it is true. The records clearly reveal the marked advance the industry has made, year by year. National Safety Council figures show that from 1934 to 1949, for example, the steel industry has moved from twelfth to fourth place as the safest industry, surpassed only by the communications, aircraft manufacturing, and electrical equipment industries.

Since the turn of the century, intense programs in safety training, use of protective equipment, and safety clothing have eliminated nine out of ten accidents. In the Corporation's steel producing operations during 1950, there were fewer than three lost-time accidents for every million manhours worked. The 1950 safety record of U. S. Steel steel producing companies was a 2.67 frequency rate and a 1.11 severity rate. Both of these rates would have appeared impossible in the steel industry several years ago. Although the U. S. Bureau of Labor Statistics final figures for 1950 have not yet been released, the preliminary figures show that among the steel producing subsidiaries of U. S. Steel, the frequency rate was 56 per cent better than the figure for the entire industry.

In February of this year, one of our mills, the Ellwood City, Pennsylvania, plant of National Tube Company, established a National Safety Council record for the nation's steel industry. The plant's 3300 employees worked 6,743,644 manhours (385 days) without a lost-time accident. The previous record was held by the Pueblo Plant of the Colorado Fuel and Iron Company.

Several other U. S. Steel plants had exceptional safety records in 1950. Four plants of the Universal Atlas Cement Corporation worked more than a full year without a lost-time accident, and one of them, the Northampton, Pa., Plant, worked five years. Nine plants of

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subsidiary companies received Distinguished Service to Safety awards, the National Safety Council's top award.

These awards indicate the outstanding records established by thousands of U. S. Steel employees and emphasize the progress which the steel industry has made in the study and application of safety practices. Improvements are still necessary, however. Safety problems remain dynamic and their solution will continue to provide industry, as well as SAFETY MAINTENANCE AND PRODUCTION, with many opportunities to use imagination and initiative.

Pictures by courtesy of United States Steel Corp.

Safe Eyes Look Back

(From page 24) use has been expanded tremendously in the last ten years, helped along in great part by the impact of the war on heavy industry. It is generally felt that plastics have a very bright future in the safety business.

Saving Their Breath

The history of respiratory protection does not go back nearly as far as that of eye protection. Actually, it was shortly before 1920 that the first respirators similar to the type now in common use were developed. The reason for the relatively slow development of respiratory protection relative to eye protection probably lies in the nature of the hazards. Eye accidents are sudden, and their consequences frequently dramatic. In contrast, respiratory illnesses most often develop slowly over long periods of time. And, although their consequences are often more serious, they are much less dramatic. Thus, the need for and the desirability of respiratory protection were not so obvious to the individual as that of eye protection.

Once underway, however, the development of respiratory devices was pushed ahead at a fairly rapid pace. As the dangers of toxic dusts, fumes and vapors became known, there evolved a tremendous line of protective devices for nearly every hazard of the nose, throat or lungs. The line ranged from simple felt-disc dust respirators up to universal gas masks and sand blast helmets.

The problems of respiratory protection are much more complex than those of eye protection because of the continual introduction into common industrial use of newly developed toxic materials. Careful and continual laboratory research is required of manufacturers who want to stay abreast of developments in this field.

A Look at the Future

The history of personal safety equipment is really the history of many different individuals and manufacturing concerns. It would not be possible to relate in detail specific achievements in the field. But one point that is frequently overlooked is the role of the trade press, of which "Safety Engineering," the forerunner of SAFETY MAINTENANCE & PRODUCTION was the pioneer.

The contribution of safety publications as a medium of exchange of ideas, and as market places for the display of new products, cannot be overemphazised. The trade papers have carried a major share of the communications between various parts of the industry, and have provided the stimulus for many of its major advances. Perhaps the most significant general development in the safety industry in the last fifteen years or so has been its emergence from the "crusade" stage to the status of a fully accredited business. And the trade publications have played a major part in that accomplishment.

In addition to providing an occasion for reflecting on the past, anniversaries also provide an opportunity of looking toward the future. No business stands still, as the last fifty years have amply demonstrated to all of us. It would be folly to attempt to predict the course of the next half-century, but it seems to us that there is a great future for the safety industry. The expansion of general business alone will provide a continuing market; dependent on the course of international affairs, the export field will again be a major outlet, for the market is already established; in the recent past, the agricultural market has begun the extensive use of safety equipment and the development of this new potential has only begun. Regardless of the many worthwhile achievements in the past, the future holds great promise. We are confident that the facilities of the safety industry will be adequate to the need.

Pictures by courtesy of Willson Products, Inc.

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What's New in Safety-Maintenance
See pages 134–135

TRANSPORTATION SAFETY

Maintenance Rules

THE proposed new Interstate Commerce Commission safety regulations will contain requirements for better maintenance of commercial motor vehicles, P. E. Tobin, regional manager of The White Motor Company, reported recently to the 21st annual convention of the Greater New York Safety Council. Addressing one of the commercial vehicle sessions at the Governor Clinton Hotel, Mr. Tobin said that good maintenance was becoming a "must" with the shortages of practically all types of new equipment.

"We must preserve our present equipment for the 'duration of the emergency' or 'preparedness period' if we are to insure trouble-free operation and eliminate costly road delays," Mr. Tobin said. If the lessons of World War II were well learned then everyone would know that good maintenance is good business. The Armed Forces will again demand good maintenance.

"Today's high fuel costs—gasoline, diesel or propane—necessitate good maintenance for economical operation. Good maintenance is good business to a single unit operator as well as to a large fleet of trucks, buses or any other type of mechanical equipment. All manufacturers have released Replacement Parts Conservation Programs that are primarily predicted on a practical and adequate maintenance program.

"All surveys, records of the Interstate Commerce Commission and the Public Service Commission indicate safety records usually depend on maintenance programs. The proposed new Interstate Commerce Commission safety regulations will call for better maintenance."

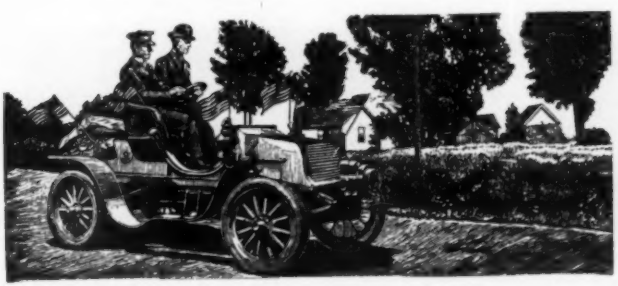
Training Fleet Drivers

DESCRIBING commercial vehicle drivers as the "Number One ambassadors of good will" for their companies, J. M. Shanaphy, manager of the Railway Express Agency's safety department, told the Greater New York Safety Council's 21st annual safety convention recently that training for safe driving was one of the most important factors in developing good public relations.

Mr. Shanaphy described to the convention's commercial vehicle session how the Railway Express Agency, which employs 15,000 drivers, gives safety training to each employee from the day he joins the organization. The continuous safety training extends also to the firm's 38,000 other employees, he said adding:

"Our experience has been that it is a mistake to rely wholly upon the printed word and oral instructions. It is not enough to tell the new man what to do—he must be shown how to do it. To bring about the best results our training program has been divided into three phases; namely supervisory training, induction training, and employee training. Results depend largely upon the trainer, so we exert the utmost care in trainer selection. Training material is furnished by the Department of Personnel and Public Relations to serve as a guide but it is studied and revised to fit local conditions."

As an instance of how a driver may become an "ambassador of good will" Mr. Shanaphy reported that when the Railway Express Agency retired on pension one of its drivers who had delivered regularly to the Bulova Watch Company in New York, the watch firm also placed the express driver on its own pension roll as having "earned a place" there by his service over the years.



Picture by courtesy of Inter-Ocean Insurance Co.

International Harvester Found the Key

(From page 32) for machine tools and equipment. In other words, we believe that you should let the supplier know what you want and then insist on getting it.

Personal protective devices, too, can and should be provided. It is interesting to note that at one of our largest plants, where we were experiencing a number of fractured toe cases resulting from employees' handling and dropping materials on their feet, the idea of providing safety toe caps for shoes was born. This was considerably prior to the time the shoe manufacturers adopted the idea of building a steel protective toe cap in their shoes. This plant made the dies, formed, punched, heat-treated the steel, and attached the steel toe caps gratis to the shoes of all employees desiring to take advantage of the offer. Needless to say, the incidence of fractured toe cases took a decided drop shortly thereafter.

The Human Element

Over the years our experience has been quite similar to that of industry as a whole; namely, that about 85 to 90 percent of the personal injury cases are the result of the man on the job pursuing some unsafe practice while performing his work. While we do not imply that nothing can be done about the remaining 10 percent of our personal injury cases, we are convinced that more time and effort must be devoted to educating and training our supervisory group, as well as the man on the job, if we are going to make any further progress in accident prevention.

Obviously these two groups have received education and training over the years, but there are many factors to be considered in a complete accident-prevention program—the methods and techniques employed, the type and maintenance of equipment, the attitude and policy of management and supervision, and that of the employees themselves. We must realize that an employee's action is largely governed by instruction—the instruction given him before he goes on the job, while he is on the job, and at such time when he is transferred from one job to another.

Despite the induction training in safety which starts at the time of the interview, followed by the instructions given by the works safety supervisor, and later by the foreman in charge before the new man actually starts on the job—plus frequent follow-up—the man on the job is only human and is likely to forget. He must be alerted constantly, he must be kept aware of the need for doing his work in the prescribed manner, and he must have the right attitude. Therein lies the challenge to keep this individual on an even keel. It is management's responsibility to see that the job is done, and the logical person to carry out the task is the foreman—the man who, above anyone else, should be the closest to the man on the job, the man who is a leader of men, the man who represents the company in the eyes of the man on the job.

Engineering, medical, industrial hygiene, safety, purchasing, and other allied departments—each has its part to play in caring for the physical hazards or requirements of the plant. However, it is in the man-maintenance field, as it were, where increased emphasis must be placed. There is a definite need to educate and train the man who is to do the educating and training in this respect. At Harvester, conference training for the supervisory group is carried on in the plants by the training directors, including safety and other matters of prime importance, and this training is supplemented by a two-weeks course at our Central School. The foremen group is further aided in training and educating the man on the job by such means as advance stimulus programs, the safety deputy plan, and the works safety committee.

Key to Success

If we are going to do anything about the work habits of people we necessarily must know more about people. We must understand them and they must understand us. We should know what makes people click; we should know more about their likes and dislikes; we should know their ambitions, their desires, their aspirations. In other words, we should specialize more in training our supervisors in the field of human relations. One must get understanding before he can give understanding. Foremen or supervisors who direct and manage people must understand and know people to the same degree that a good mechanic knows and understands the complete mechanism of a machine tool.

Considerable time and effort have

STEEL STORAGE (Before) Former method of piling steel by crane: no standards used, various shapes and sizes piled together, with inefficiency, untidiness and accidents to personnel resulting.

STEEL STORAGE (After) Present methods of piling steel by crane: steel and concrete standards aid materially in efficiency, good housekeeping; prevent falls of material and injury to workers.

been expended to instill in the minds of management the absolute need for manufacturing a product to meet the highest standards of quality—on time and at the proper costs. Management has furnished the ultimate in work-surroundings to accomplish this goal. We repeat: We believe now it is in the field of human relations that the key to greater success lies in industrial relations, of which safety is an integral part. We must endeavor and we are endeavoring to make our supervisory people experts in their handling of the men under them. The man on the job wants to know why; he wants to have the right to express himself; he wants to be recognized; he wants to feel that he, too, is an important cog in the whole scheme of doing things; he wants to feel that he is a member of the team.

These expressions and feelings on the part of the man on the job should be no cause for alarm. They are just natural manifestations. We can aid in the development of the desired attitude of people to a large degree by better understanding their problems and situations, by setting a good example, by counseling with them; and the sooner this is accomplished the sooner we shall obtain the desired results.

Pictures by courtesy of International Harvester Co.

Sustained Safety

(From page 56) the action that was taken is submitted to our General Office for review. However, almost invariably it is found that suitable action was taken following the foreman's investigation and review of the case by local management and the safety committee.

These measures, among others, were the first steps taken toward re-establishing and extending the principles of safety that had been followed in NABISCO.

The Personal Touch

The important job that remained was to incorporate a satisfactory system of *personal* safety contact among 50 manufacturing units and more than 250 sales and distribution units for the purpose of efficiently maintaining the safety procedure.

To accomplish this, safety has been introduced, as an integral part, into our greatly expanded personnel relations activities. Under this set-up, and apart from the full-time safety engineers who personally visit all locations, our company has Regional Personnel Relations Directors with headquarters at New York City, Chicago, Atlanta and Oakland, California. One of their functional responsibilities is to co-ordinate and assist the line organization within their regions to administer the safety program. These Regional Directors periodically visit all of the NABISCO units within their territories. At all of our larger manufacturing units, there are also

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Branch Personnel Managers who are expressly charged with the responsibility of assisting the line organization in maintaining the safety of employees.

Of considerable importance, too, is the contribution toward safety stimulus that has been afforded by the Suggestion System Division. The Director of the Suggestion System and his assistants visit the units and their promotional and publicity activities give constant impetus toward accident prevention.

Frequently the executive officers of our company discuss the safety problem on their visits to the various units and many times have attended functions devoted solely to the cause of accident prevention.

The Personnel Development Division of our company, through its employee training and educational programs, has added appreciably to the efficient continuance of the safety program. Here, again, staff members visit the units and conduct conference training programs that include sessions on safety.

Within this framework our full-time safety staff endeavors, by every means at its disposal, to provide the tools and the incentive to keep the safety machinery in constant, efficient motion. Sound-slide and motion picture films are made available; contests, awards and publicity are arranged; posters, bulletins and progress reports are issued; special analyses and recommendations are prepared; the products field is explored for new, practicable safety equipment; and time and effort is devoted toward co-operation with recognized governmental and other safety organizations.

As a result, since the year 1943, our rate of accident frequency has decreased with each succeeding year. In 1946 NABISCO had decreased its rate of lost-time injuries by 30% over 1944. In 1949 there was, again, a decrease of 30% in the rate of lost-time injuries, and this was a 30% decrease over the previous "good" year of 1946—and 1950 was better than 1949.

We feel that this steadily declining rate of lost-time injuries, with a decrease each year over the preceding year since 1943, is a firm basis for the belief that safety is progressing in the right direction.

In short, our safety program has been so designed that a maximum of person-to-person contact is achieved toward establishing, checking and analyzing accident prevention performance, together with a system of reporting procedure that provides a reasonable analysis as to the manner in which the program is functioning.

We are attempting to establish a sound program that excludes sporadic outbursts of activity for we believe that an occasional campaign month or other "quickie" method serves only to temporarily arouse safety interest and action which, all too frequently, is followed by a reactionary let-down that nullifies any gains.

We want a safety program that will make safety a commonplace procedure, not a crusade. We want it to be as familiar and as nourishing as three meals a day instead of an occasional 12-course dinner. We want safety to be a part of the job, no less important than production, no less important than the pay envelope; in fact, no less important than life itself, for that is the road in which true accident prevention lies—and that is the road all of us in NABISCO hope to travel.

Pictures by courtesy of the National Biscuit Company.

Noise Abatement Meeting

THE second annual National Noise Abatement Symposium to discuss and report on the noise problems affecting the nation's homes, offices, stores and factories, will be held in Chicago on October 5th at Technology Center. The symposium will be sponsored by the Armour Research Foundation of the Illinois Institute of Technology, the National Noise Abatement Council, and other organizations.

H. A. Leedy, director of Armour Research Foundation, has been appointed chairman of the committee arranging for the symposium, George W. Handy, of Buffalo, president of the National Noise Abatement Council, has stated. Assisting Dr. Leedy are Wallace Waterfall of New York, secretary of the Acoustical Society of America, and L. F. Yerges, of Chicago, chairman of the Ordinances Committee of the Noise Abatement Council.

Findings of the Symposium were made available to the public and covered such subjects as: the effect of noise on human behavior and communication; noise abatement in connection with hearing; apparatus for noise measurement; control of noise in mechanical equipment; control of noise in buildings and control of noise by education.

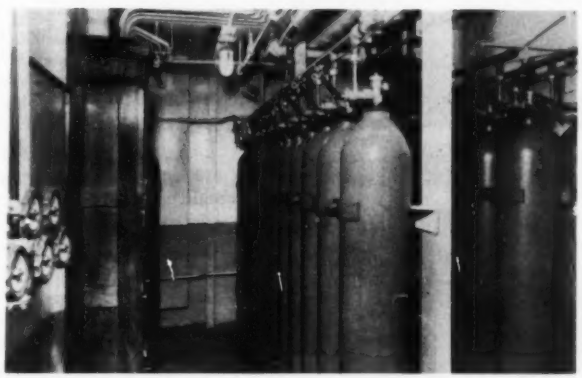
Please use # F-61 in requesting further details.

MONARCH OF SAFETY ARRIVES

OF SPECIAL interest to safety, fire protection and insurance interests, as well as the general public, was the rousing welcome given the new 14,000 ton luxury liner "Ocean Monarch" upon her entry into New York harbor recently. With ship whistles blowing their usual marine greetings and New York's famous harbor fireboats pumping millions of gallons of water into the air, the newest queen of cruising vessels was ushered to her pier upon arrival from an English shipyard.

The new pride of Furness Withy & Co., Ltd., has been specially designed to meet demands of the American travelling public for the utmost in safety, service and luxury. Her spacious public rooms incorporate every facility for entertainment and every cabin on the ship is an outside room with its own private bath.

The 440 passengers of the "Ocean Monarch" will cruise on a ship as fire-safe as modern, smoke-detecting devices and extinguishing equipment can make her. Safety starts with the smoke-detecting system which is of the visual and audible type and protects nine cargo spaces and the paint and lamp rooms.



This fire control room, located on C deck, contains thirty-seven 80-pound cylinders of carbon dioxide. System is actuated by turning directional valves which permit fire-killing gas to totally flood cargo spaces, ship's storerooms, or the boiler room. Operation of any part of system sounds warning alarms throughout ship and secures ventilation in space concerned. Smoke detecting cabinet (left) continuously draws air samples from cargo holds.

Signals on the Bridge

The next phase of safety is the fire extinguishing arrangement for the machinery spaces, particularly the oil fired boiler room, and the cargo spaces. This system uses carbon dioxide for instant smothering of any incipient fire. The control room, located forward, houses the main fire detecting and extinguishing equipment. Some of the carbon dioxide cylinders are located in a passageway close by the control room and arrangements are made to give visual and audible signals on the bridge. In addition to the large number of 80 lbs. fire extinguishing cylinders located within the control room, gas sufficient to provide independent charges for the cargo spaces and boiler room is available. The carbon dioxide system protects the nine spaces covered by the smoke detecting system and in addition, five extinguishing

lines protect the ship's refrigerator provision spaces.

The engine room has an independent carbon dioxide hose reel unit supplied by two 80 lb. cylinders. The hose is of sufficient length to reach any corner of the compartment and in addition six 15 lb. portable units are available.

"Total flooding" of the boiler room merits particular attention as it provides for the control of fires *above* floor plates. Regulations set forth by the International Convention of 1948 call for the control of fires below floor plates only. However, fire records show that quite a number of ships have been lost as a result of fires developing above floor-plate level with no extinguishing system installed capable of coping with them. The "total flooding" system, beyond the requirements of all current regulations but fully approved by them, provides complete fire protection for this space.

The "Ocean Monarch" with its streamlined silhouette, raked bow, rounded stern and single large funnel represents twelve years of planning and wartime waiting prior to completion for the luxury cruise service out of New York. It is a sister ship of the "Queen of Bermuda," Furness Lines regular Bermuda service ship but with brand new lines, finer, sleeker and suited for service in Canadian and West Indies waters.

Architect's Dream

The new "Ocean Monarch" is an architect's dream of the perfect cruise ship, built for the fastidious American tourist and "custom tailored" for cruising. In addition to the Grand Lounge, Smoke Room and Coral Cafe night club, other features include a permanent motion picture theatre and an outdoor swimming pool overlooked by two wide spread wings on the deck above.

Décor embodies the use of light colored veneers in figured birch, ivory sycamore and burr ash with contrasting dark walnut. Staterooms are decorated in rose and ivory and have royal blue and cream colored furnishings.

The Grand Lounge, built with many fire resistant features, is a magnificent mansion room 72 feet wide and covering the shape of the bow sweep of the bridge front. From this room a wide view of the sea can be obtained through picture windows on three sides and it is decorated with silk damasks and tapestries in brown, rose, and pastel green. In the Coral Cafe, completely air-conditioned, mirror plate has been used liberally for decorative as well as fire resistant purposes.

The air-conditioned theatre is equipped with panic-proof doors and the projection booth is completely fire-proof.

Through the liberal use of fire resisting treated woods, mirrors and the most modern lighting facilities, the utmost safety is achieved. Walkway surfaces and stairs in the various companionways are treated to resist slipping accidents and falls. Thus, passengers and crew are surrounded with the latest safeguards to assure ultimate protection while enjoying the service and luxury traditional with the Furness Lines.

Fire control picture by courtesy of Walter Kidde & Co.

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Loss Control Comes of Age

(From page 22) on the spot killed four persons.

Full-Time Safety

By then, The Travelers was in the safety business full-time. In 1903 the nature of industrial safety work was largely restricted to work against mechanical hazards. The emphasis was on machine guarding. That emphasis remained about 20 years and yeoman work was done in the field. One of the leaders in the field is O. D. Bayrer of The Travelers.

As a matter of record, The Travelers engineers have created, since 1926, about 750 designs. The Travelers design unit averages at least two inquiries a week for variations on old design or for completely new work.

Two of the most widely-known guards are those for hand-fed jobprinting presses and on leather and paper embossing presses.

Both are manufactured, royalty-free, by reputable firms under specifications in patents credited to Bayrer and The Travelers.

Records of one of the states showed that before Bayrer's embossing press guard was put to work, there had been one amputation for every ten man-years of work on those machines.

There are now 600 in operation with guards and no one has been injured since the guards were attached. With variations, the guard has been applied to 12 other related types of machines making a total of about 1,000 machines guarded.

In 1925, two men in The Trav-

elers, Robert Sullivan and Jesse W. Randall, Secretary and Assistant Secretary, respectively, of the Compensation and Liability Department, called in an engineer named H. W. Heinrich.

Randall, now President of The Travelers Insurance Companies, and Sullivan, asked Heinrich to go back to his office, put his feet up on the desk and think about ways and means for further work in industrial safety.

Heinrich did more than think about the subject. He began a new career of planning, organizing and acting in the fight against death and injury in industry.

His first move was to seize upon the manufacture of bread as a dramatic yet simple and widely-known device to sell safety.

Bakers, in their search for a mixing process which would render dough homogenous and glutinous, had devised a vat which contained curving blades for mixing. Regularly, during the mixing process, the man attending the machine had to open a door on the lower half of the machine and, with a knife, cut away sticky chunks of dough from the blades. Of course, he stopped the action of the machine while clearing the blades, but had to start it up again to get at other blades.

It was at this point that bread-making was a dangerous business. Many times, experienced workmen, calloused to the destructive possibilities of the mixer, ignored precautions and many times newspapers carried stories about such men suffering severed fingers or hands or arms or even decapitation.

Heinrich devised a mixer which required no such dangerous actions as scraping blades, but it didn't make dough elastic and spongy enough to satisfy bakers. Yet, the research did lead to the development and use of a remote control operating device and a safer mixer.

The Four-to-One Ratio

The search for a dramatic selling point went on, and in 1926, Heinrich and Travelers engineers announced the "four-to-one" accident cost ratio. This thesis pointed out that the direct cost of an accident is but a fraction of the total cost. Indirect costs, it was found, often outweigh the direct cost as much as four-to-one. An injury to a workman, by itself, is an almost certain indication that something is seriously wrong with that particular operation; that the plant is working at something less than total efficiency. The injury itself is compensable but all the hidden indirect costs come out of the company's till.

Here, then was the incentive safety men needed to sell their proven wares. Here was the idea which manufacturers took to heart. They began to listen earnestly to safety engineers.

Another important step in bringing about this change was the development in the twenties of the

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SAFETY AWARD

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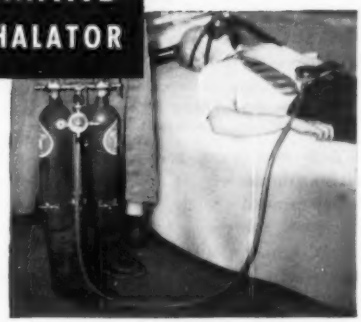
EMPLOYEES requiring emergency oxygen for shock, fume inhalation, heart attacks, heat exhaustion, or respiratory difficulties can be treated simply, easily and effectively with this new Scott *Demand* Oxygen Inhalator.

Portable and easy to use, the Scott *Demand* Oxygen Inhalator provides emergency treatment in minimum time—and at minimum cost. Nominal initial cost; oxygen consumption comparatively low, due to the Scott "demand" principle which assures oxygen instantly at any rate and at any volume "demanded" by the patient.



TYPE "B" Scott *Demand* Oxygen Inhalator (above).
With carrying case, with or without cylinders.
Same as above, without cylinders or carrying case.

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American Standards Association's Code for compiling Accident Causes. It was developed under the chairmanship of Heinrich and brought order out of chaos in the definition and analysis of accident causes.

Corollary findings by Heinrich included "The Foundation of a Major Injury," which indicated that in a unit group of 330 similar accidents, all from the same personal, unsafe act, one resulted in a major injury; 29 in minor injuries and 300 in narrow escapes from injury. This served to point up the necessity for accident control to start at the base of the supervisory ladder—with the foreman.

Hazard of "Man Failure"

Also concerned here in Heinrich's thesis of "man failure" which proved that the human element was the prime cause of accidents. Among 100 accidents, 88 are caused by man-failure, ten by machinery difficulties and two by so-called "acts of God."

The Travelers', and Heinrich's latest contribution to the field of industrial safety is the development of supervisory control methods as expressed in the "Basics of Supervision."* This reflects Heinrich's belief that the foreman has direct control of accident prevention.

Says Heinrich, "We just can't do business at all without some responsible direction and some control of employee performance. These activities are the task of the supervisor. This is the 'downbeat' of supervision."

Badly stated, the "Formula" is simply this: Identify your problem. Find and verify the probable reason for it. Select the remedy for it and apply that remedy. To this end Heinrich has prepared a list of six categories consisting of four major items each, which cover all possible problems. There are six possible reasons for the existence of a given problem and four possible remedies for each reason.

It's simple and it works.

Utopia Not Reached

But the overall work of safety engineering is not done. Since 1938 the death rate per 100,000 workers has fallen from about 37 to 28. Total deaths in the same period, on the other hand, have decreased only a minor fraction.

Last year The Travelers Casualty Engineering and Loss Control Division spent $2,630,809.11 for salaries, travel, equipment and overhead to maintain its work. There are 523 full-time engineers and other employees in the field and home office under direction of James A. Burbank, Superintendent of the Division since 1934.

Leveling of the trend in total deaths since 1938 might suggest that maximum accident reductions had been achieved. This is not necessarily true. Many establishments still operate with inadequate safety programs, and application of proved accident prevention techniques in these firms can well lead to further improvement throughout industry, perhaps equal to that in the '20s.

Photographs by courtesy of The Travelers Insurance Company, unless otherwise noted.

* Published by Alfred M. Best Company, Inc.

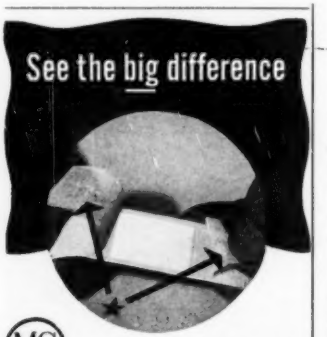
Mid-Century View

(From page 40) an amber field of light transmission. At that time little thought was given to the dangers of invisible ultra-violet and infra-red radiations and to the visual acuity in relation to the light transmitted by these early filters. It was found, however, that filter lenses of the blue-green shade used today were more efficient and gave the wearer better perception of the work process.

The early glasses for electric welders used three pieces of differently colored glass—red, green and blue—one on top of the other. Welders, through this combination, had a comfortable field of visible light with which to work. By varying the depths of the colors, it was possible to control the intensity of the visible light reaching the eyes. The basic idea of the filter lens was improved and simplified by using a colored gelatin, sandwiched between two pieces of clear glass. As with the goggles for gas welders, however, no thought was given in the early days to the invisible radiations.

Just before World War I, manufacturers conceived the idea of using a single piece of glass of a shade which would give a comparable effect to that of the three-piece lens and the gelatin method. The development of the single lens for electric welding was an important step forward, because it reduced the weight and made possible the setting up of color depth standards. In the early twenties these standards were established and in conjunction with them, consideration was given to controlling injurious invisible light radiations of the industrial processes.

Today we take these standards pretty much for granted and perhaps do not fully appreciate the



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NON-RAVEL PAD . . . no loose threads in wound area . . . looks neat, stays neat!

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Plastics are becoming increasingly important for goggle lenses, frames and sideshields.

great contribution made by them. Because of these standards, today's filters are of uniform absorptive efficiencies for both gas and arc welding processes, lenses are of uniform size in relation to the specific type of application and the visible light transmission factors are held constant.

We have also learned that the hazards of visible glare and invisible light radiations are not limited to welding operations. These hazards are now recognized in numerous occupations such as foundries, forges, furnaces, steel mills and exposure to direct and reflected rays from the sun.

Filter-type lenses are not only protective devices, they are also aids to production. Special types of glass make it possible to measure temperatures and make observations within incandescent sources. These highly specialized filters are available today to the safety man and in many instances are the result of specific research into his particular problem.

Although we have seen tremendous advances in the field of light filtration in the past, the development of new processes will continue to pose new problems. Even today, the problem of light control goes far beyond the walls of industry. It extends into our recreation, onto our highways and onto the seas.

Although impact and radiant hazards have been discussed separately here, protection against these two general types of hazards can of course be combined in one unit. In other words, filter lenses can be heat-treated to give the wearer protection against flying particles as well as glare or invisible rays. There is a third factor which can be incorporated into the lens and that is the corrective factor.

Corrective-protective lenses are designed primarily as protectors, but they are at the same time able to correct any visual deficiencies the wearer may have. This combination provides greater comfort in relation to protection, along with increased efficiency in the particular type of work. It is, however, a specialized application of the protector and as such must meet all the specifications for safety efficiency.

Plastics Stand Guard

Accident prevention must maintain a delicate balance between what is necessary to wear and what is comfortable to wear. In recent years, increasing emphasis has been placed on making safety equipment less cumbersome, but without sacrificing the protective factor which is the primary objective.

Typical of the uses of new products has been the adaptation of plastics for eye protection purposes. These light weight materials were used in the late twenties for face shields and proved to be particularly advantageous where full face coverage is needed against acids and other corrosives, some heat radiation, molten metal and general impact hazards. Since then, plastics have been used in various types of goggles, for lenses as well as for shields and frames.

Saved Eyes

What has eye protection accomplished in American Industry? Some idea of the success of the program can be obtained from the records of the Wise Owl Club. This organization is promoted by the

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"The Nation's Sweat Band"

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National Society for the Prevention of Blindness and its membership consists of people whose eyes have been saved by the wearing of safety goggles. The club was organized in the autumn of 1948, and in the two and one half years since that time it has reported 2,231 eyes saved. These prevented-accidents involved 1,761 people in 321 plants employing 518,364 persons. It should be remembered, moreover, that the saved eyes, as shown in these figures, are only a partial list and that there have been many other unrecorded instances of eyes that are still seeing because they were well guarded.

On a railroad where similar steps were taken to record eyes saved through the medium of protection, in ten months' time there were 28 eyes saved.

A typical characteristic of the safety movement is that it seems to set off a chain reaction. A person or organization becoming interested in one phase of accident prevention, soon finds that interest spreading to other aspects of the problem. The American Optical Company, as its name implies, was originally concerned with the manufacturer of optical products. It recognized early the need for industrial eye protection and as a result, it began to study industrial hazards. It saw the possibility of controlling economic loss from accidents to various parts of the body as well as to the eyes, for the frequency of accidents was increasing as industry expanded and new processes began to operate. The social and economic loss created a situation which the American Optical Company, along with other manufacturers, tried to meet. In the early thirties, the company branched out into respiratory protection and various types of safety clothing. The types of exposure, the suffering caused by injury and the liability expense of accidents are increasing all the time. Now in mid-century, it is a challenge which safety equipment manufacturers must face just as they have in the past.

These manufacturers however, are deeply indebted to the safety engineer in industry, because it is only through him that hazards are recognized and brought into the open. Only when the hazards are known, can steps be taken to control them. It is therefore imperative for the safety engineer to cooperate with the safety equipment manufacturer. By working together and by continuing to exchange ideas, as they have during the past fifty years, they can maintain safety in American's production.

Pictures by courtesy of the American Optical Co.

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Day After Is Safer

(From page 50) have long "no accident records," and Mr. Irenée du Pont, then president, agreed to recognize personally any record made by any plant which equalled or bettered one established by the Barksdale, Wis., commercial explosives plant. That year Barksdale with 200 employees worked a total of more than one million man-hours without a single disabling or time-losing injury. Individual prizes for employees of winning plants were presented for operating for graded periods without occurrence of a tabulatable injury.

From 1923 to 1927, 19 plants bettered or equalled Barksdale's record, so in 1927 to maintain the interest of employees after records had been achieved the present "no accident" award system was established. The plan includes awards of three prizes. The first is the General Managers' Prize based on accident free records for periods calculated on the size of the plant. The second is the President's Prize, awarded for performance one and a half times that required to win a General Managers' Prize. The third and highest is the Board of Directors' Prize, awarded for a no-accident record two and a half times that required for a General Managers' Prize.

Since January 1, 1946, plants of the company have won General Managers' Prizes 65 times; President's Prizes 56 times; and Board of Directors' Prizes 103 times. This year the Du Pont Company became the first to win the National Safety Council's "Award of Honor for Distinguished Service to Safety" for nine consecutive years when the 1950 award was presented to it.

Experience born of 149 years of devotion to safety as a major concern of management is embodied in the program by which these records have been achieved. As in the beginning, safety is one of the fundamental problems of consideration in the architectural and engineering design of structures and equipment when operations of the company are in the blue print stage.

Organized for Safety

Once the plant is in operation, primary responsibility for administration and direction of the safety program and organization falls upon the plant manager. He directs

the program through a central safety committee, of which he is chairman. On this committee serve the men heading the various operating sections of the plant; the medical supervisor; and the plant safety supervisor.

This central committee initiates, organizes, and directs all safety activities on a plant-wide basis; supervises the safety educational program; and probes all cases of personal injury. By its investigations, the committee determines causes of injuries in each case; decides whether disciplinary measures seem to be merited; and makes recommendations as to the measures. The committee distributes findings and statements of policy.

The committee may make special plant safety inspections and upon the basis of results may develop and promulgate means for removing hazards. It is also responsible for enforcing safety rules and for initiating and supervising tests and studies concerned with safety matters. The committee is accountable, too, for installing necessary safety protection devices and for seeing that they are kept in operating condition. Direction of safety contests and campaigns is another duty.

Within the Departments

Each department has its own safety committee of which the department head, a member of the central committee, is chairman and on which foremen serve. Departmental committees meet semimonthly and each committee deals with the safety problems within its area, referring more serious and plant-wide questions to the central committee.

Departmental committees also help distribute material concerning safety. They originate, guide and coordinate departmental activities; investigate departmental personal injuries; enforce departmental rules and standards, make departmental inspections and correct hazards where they can; and are responsible for departmental safety publicity.

Next in the line safety organization come the committees headed by group leaders or foremen. Each leader or foreman is chairman of a committee, which, when practicable includes all the men and women in the group. When the number of men under a leader or foreman is too large the workers share service by rotating membership.

Foremen's and leaders' committees meet once a week. Meetings are short, but handle all safety matters of the group.

This committee organization emphasizes that safety is a line organization responsibility.

The Safety Engineer

Key man in safety organization is the safety engineer. In larger plants he acts as advisor to the management on safety and has specified duties of his own to perform. He keeps posted on new safety techniques, devices and activities; analyzes personal injury cases and records, and studies the special hazards and problems of the plant. He is responsible for determining that all safety equipment is kept in top operating condition, and makes inspections of gas masks, elevator safety guards and other devices that require technical attention to make sure they are properly installed and in operating condition.

To sharpen wits to the ever-present necessity for attention to safety, the educational program includes the display of graphic and pictorial reminders throughout the plant; warning signs at danger points; and the distribution of timely safety literature to workers. Safety sections are printed in each plant magazine.

In addition to educational activities, physical safeguards that protect employees against moving parts of machines and other types of exposure are elemental features of Du Pont's safety program.

PLANT SAFETY

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These include the usual handrails, cages, and equipment guards of approved types, and protective uniforms, in many cases of special design, goggles, gloves, hairnets, masks, and crush-resistant footwear.

Show-how is an important feature of the program designed to alert workers to the perils of personal adornment and the uses of special safety equipment. Girl workers are shown how earrings, wrist watches, and jewelry can trap the unwary into painful accidents. They also learn how gloves can protect hands against mangling cuts and bruises, and are taught approved methods for pushing hand carts so knuckles do not get skinned against passing projections.

The company's 1950 safety performance portrays graphically how the Du Pont program has benefited all year after year. During 1950 disabling injuries happened in the Du Pont organization at the rate of .72 for each million man-hours worked. That rate was about five per cent lower than 1949 though average employment during 1950 was seven per cent higher than 1949. Put another way, more than 99.8 per cent of the company's men and women went through the entire year without suffering a single lost-time or disabling injury. In 1950, Du Pont's safety team, including an average of 80,000 men and women throughout the year, established the best record for freedom from time-losing or disabling injuries in the history of the company.

Du Pont men and women, like employees of American industry generally, are safer on the job than at home. An outstanding achievement was that of the Martinsville, Va., nylon plant which worked 28,132,583 man-hours without a single tabulatable injury. The plant holds the world's record for safe operation, a record formerly held by the Seaford, Del., nylon plant. A record holder, too, is the Ilion, N. Y., works of the Remington Arms Company (a Du Pont subsidiary) which established a record for the iron and steel products. Another record winner is Belle Construction, at Belle, W. Va., which holds the record for the construction industry.

Burnside Laboratory, an explosives-department laboratory located at Carney's Point, N. J., has the distinction among Du Pont operations of having worked the longest period of time without a time-losing or disabling injury—more than twenty-three-and-a-half years.

Pictures by courtesy of E. I. Du Pont de Nemours & Co.

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The Story of Safety

(From page 16) potential dust explosions be kept out of the realm of certainty.

Dust Diseases

In the early days of this century, industrial illness was rampant. In the mine fields, in chemical plants and in other industrial operations, harmful dust, fumes, vapors and gases took their toll. There was a frightening spread of tuberculosis, silicosis and other ills of the lungs. Slow and often painful death awaited many tortured victims.

Years ago the pages of industrial publications were filled with a gloomy parade of statistics showing industrial hazards of the lungs. The growing danger had to be arrested and controlled. Respiratory protection, a newly recognized science, took giant steps. It was then that general industry made possible the rapid application of this form of protection in hazardous work-places.

As early as 1920, the first crude filter-type respirator was placed on the market. Prior to the establishment of U. S. Bureau of Mines, now the chief approval body for respirators, this safeguard was tested and labeled by the Underwriter's Laboratories. This was the first move in protecting workers against the harmful effects of contaminants.

Today the development of respiratory protection has brought in its wake self-contained breathing apparatus, the supplied-air respirator, air-purifying gas masks, and filter-type and chemical cartridge respirators, as well as equipment designed to restore breathing functions in victims facing almost certain death.

Eye Protection

There is no more spectacular phase of the safety movement than the progress of eye protection in industry. And yet, even today, no less than 300,000 workers each year suffer eye injuries! At least 95% are entirely preventable by the mandatory use of eye protective devices of proven quality, scientific design and proper selection.

Harmful rays, strong light, chips, dust, acids, molten metal and irritating gases are the agents whose deadly work is carelessly invited. Still, the development of protective devices from heavy cumbersome equipment to lightweight units of

proper design is a dramatic story of countless eyes and millions of dollars saved.

In 1908, industrial safety goggles took their first practical form. But it was the introduction of heat-treated glass around 1916, that gave them a secure place in other than light-duty operations.

In later years, plastics have "come of age" as eye safeguards suitable for many industrial operations and for use over long periods of time where the weight factor takes on added importance.

Proper Illumination

Upon our entry into World War I in 1917, it became more vital than ever to use every possible safeguard to protect industrial manpower for the war effort.

For the first time, public consciousness was aroused to the menace of accidents which jeopardized national production. All phases of safety, therefore, took on added significance throughout the country.

With the need for greatly accelerated output to meet the demands of our armed forces, every avenue was explored to reduce industrial accidents which interfered with production.

About that time a survey of accident causes revealed that at least 15% of all industrial accidents could be traced to inadequate or improper illumination. Insidious glare, blinding and dark spots, as well as general eye fatigue, were a breeding-ground for accidents. A program was started to enable wartime industrial employees to "see for safety."

Today, glare-proof electrical fixtures, adequate in number; supplementary lighting for close work; lighting codes developed by illuminating engineers; maintenance of regularly cleaned lighting units —all serve to eliminate danger zones in industry.

Color as an aid to accident prevention is a development which would have baffled the safety man of 1900. Through the years, it has been found that color speaks the language of safety and in many different tones ranging from a whisper to a shout. Color protects industrial employees against physical and mental fatigue, long recognized as a primary cause of many accidents and often helps the present-day worker to see the potential accident on the job long before it can occur.

Generally accepted color codes, worked out through the years, help to heighten illumination, reduce eye strain caused by glare, point up the location of certain dangerous hazards, make proper plant maintenance easier, improve morale and thus step up efficient economical plant production.

Head to Foot Protection

Shortly after the close of World War I, safety hats were developed largely for use in mining where head injuries brought swift and final results. Pioneers then gave thought to producing a safety hat providing such factors as comfort, appearance, lightweight, proper size and long life. It was then that protective hat comfort took on new meaning and the margin of safety was thus greatly increased.

Safety clothing for general body protection has advanced with rapid strides from the days of the makeshift aprons or worn-out Sunday serge to garments and apparel especially designed to guard against accidents in industry.

Safety clothing is now made up for protection against specific hazards. It is chosen for proper fit to guard against loose flaps and pockets, and special materials are utilized to prevent burns caused by fire or liquid splashes. Protective suits and hoods safeguard the worker against corrosive or other harmful substances.

Aprons have been developed to cope with new processes in industry —for men exposed to radioactive substances aprons of rubber or other waterproof material are in daily use. Lead aprons of proper

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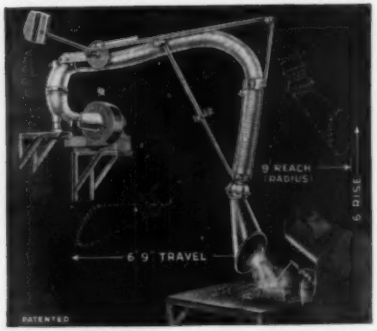
Welding without ventilation. Note smoke and gas clouds.

(Right) Welding with Ruemelin Fume Collector.



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One of the greatest advances in the field of industrial safety, and certainly the greatest single contribution to foot protection, was the development of the safety toe shoe. In almost every plant, foot accidents resulted in painful and costly injury over the years.

Basically, the safety toe is a strong metal or fibre cap built into the toe of the shoe to provide toe protection without sacrificing comfort or flexibility. Blows which would reduce the ordinary shoe to pulp are warded off by the hidden armor, a "bomb-proof shelter" for the toes.

Other types of safeguards include the wooden sole shoe to combat such conditions as dampness, oil or acids underfoot; spark-proof shoes for use in the presence of flammable materials or explosive atmospheres. Also special soles of other types have been developed for use in the presence of specific dangers.

Time was when the industrial safety shoe could take no prize for appearance or glamour. Today, a casual glance would scarcely distinguish oxfords and even loafer-type safety shoes from street shoes, so well have protection and appearance been combined. The original "gun-boat" has long been sent into discard.

General Plant Maintenance

In the early days of the safety movement the prevention of accidents was thought of mainly in terms of specific safety devices. The immediate problem was to win the acceptance and use of such equipment as guards for obviously dangerous machinery.

But as we began to see the full scope of safety, this simple truth took form; good maintenance leads to safety and efficient, economical production; conversely, with poor maintenance it is hard to conceive of safe working conditions.

Through consistent education and continuing publicity, the problem of proper maintenance and its relationship to safety and production began to draw its due share of attention. Today, that problem presents no difficulty of solution.

Plant maintenance is no longer viewed only in the light of "everything in its place," and good maintenance can not be evaluated on the basis of just clean floors alone. Proper maintenance must encompass the maintenance of good-will and satisfactory employee relations. This factor takes in genuine first-aid, employee comfort, sanitation and hygiene in addition to ventilating systems and a host of other measures. Together they all add up to one of the wisest investments managements can make. The cost is recovered many times over and in the shortest possible time.

No longer are we misled by the age-old cry that safety and good maintenance "interfere" with production. This fallacy is blown sky high by increasing emphasis upon the importance of many practicable measures designed to effect safety. This automatically reacts favorably upon production schedules.

As a matter of simple fact, it is the accident—certainly not the safety measure—which slows up or even halts production.

Ladders, scaffolds, acid handling equipment, warning signs, manila rope and wire cables, lift trucks, flooring and roofing material, all take their rightful place as contributors to the nation's safety campaign to conserve our human and material resources.

When the safety movement was very young, only the most ardent crusader visualized the connection between floor maintenance and accident prevention or health conservation.

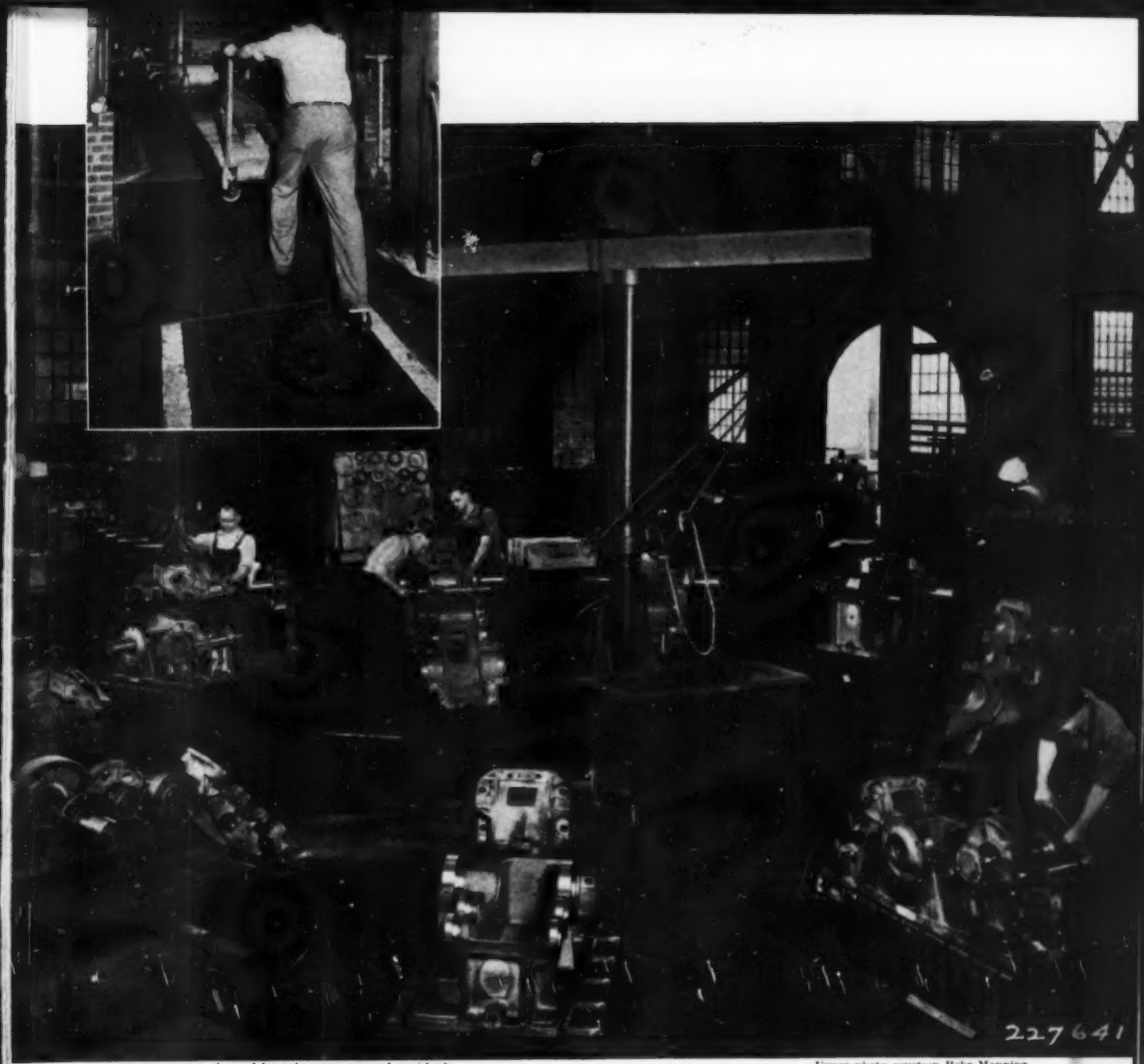
Decades ago it was generally accepted that the floors of any manufacturing establishment were necessarily dirty. In fact, the degree of production efficiency often was measured by the amount of debris left lying around.

Today, however, it is recognized that floor cleaning devices, scrubbing equipment and cleaning products not only improve appearance and morale but are a great factor in preventing industrial accidents and safeguarding health.

Sanitation and Health Conservation

A survey of foundry layouts made nearly fifty years ago, covering washroom facilities, presents a

Hazardous glare and unguarded belting made this old-fashioned shop a trap for accidents.



Slip-resistant ramps and good housekeeping prevent accidents.

Upper photo courtesy Behr-Manning.
Lower photo courtesy Westinghouse.

depressing picture when viewed through the eyes of 1951.

Non-existent or poor standards of hygiene gave new meaning to the phrase "Survival of the fittest."

It is no exaggeration to say that thoroughbreds and circus menageries are maintained in better conditions than the average industrial employee knew in the early 1900's. Even outbreaks of typhoid fever were not entirely unknown and could be traced to the almost primitive conditions of toilet cubicles, washrooms, and drinking-water taps.

Today, sanitation and industrial health conservation are far-ranging. They cover the obvious factors of ventilation and cleanliness, and extend to even first-aid rooms in many small plants.

Adequate, well kept restrooms planned in accordance with accepted codes; high standards of cleanliness for washrooms and locker rooms; maintenance of pure drinking water and sanitary dispensers; banishment of the old roller towl; use of safe and efficient soaps and cleansers—all these contribute to the health of the nation.

Industry has learned its valuable lesson; absenteeism arising out of illness caused by improper sanitation maintenance can retard efficient production and shoot up costs to the same degree as the more dramatic accident.

Women in Industry

In the early 1900's mothers and grandmothers of the present day slacks-and-snood set would have voiced cold and very forceful disapproval at the thought of young ladies in heavy *(To page 136)*

industrial Hygiene

ASSOCIATE EDITOR
JACOB A. GOLDBERG, A.M., Ph.D.

From the collection of Bettmann Archive.

Progress in industrial hygiene. Early hoods for workmen in this buffing room.

Keeping the Worker Well!

By C. RICHARD WALMER, M.D.
Managing Director
Industrial Hygiene Foundation
Mellon Institute, Pittsburgh, Pa.

ALTHOUGH industrial hygiene is one of the newest adjuncts to preventive medicine, it has been practiced, in one form or another, for at least 2,300 years. It is therefore most fitting for SAFETY MAINTENANCE & PRODUCTION to give its readers a review of this interesting development in social consciousness on the occasion of the fiftieth anniversary of the magazine.

Hippocrates, the great saint of medicine, is credited with being the first to record the adverse effects of exposure to lead on miners and metallurgists. And if you think face masks are a protective device only developed in the twentieth century, you have a surprise coming: refiners of cinnabar (mercuric sulfide) wore bladders over their faces in the first century of the christian era in order to avoid inhaling dust.

Not much was recorded on industrial hygiene during the Dark Ages, but Ellenbog, in 1473, described industrial poisoning from lead and mercury, and

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From the collection of Bettman Archive

This woodcut of 1878 shows loading operations in a Nevada mine in the days before good ventilation and safety clothing were available to protect the miners.

suggested preventive measures. Agricola—who received twentieth century acclaim for a book he wrote in the fifteenth century which former President Herbert Hoover translated during his engineering days—recognized ulceration of the lungs caused by the inhalation of certain kinds of dust.

"Miners' diseases," affecting lungs, stomach, and intestines, which resulted from digging, smelting, and washing various metals, were described by Paracelsus in a treatise he wrote on occupational diseases in the sixteenth century.

First Complete Treatise

Before abandoning early history to trace the modern development of industrial hygiene, Ramazzini, Chevallier, and Lehmann deserve mention for the pioneering work they did in their times.

Ramazzini's *De Morbis Artificum Diatriba*, which he published in 1700, is the first book that can be considered a complete treatise on occupational diseases. Its 1718 edition, bound in parchment, written in Latin with Italian commentaries, is one of the prized possessions in the library of Industrial Hygiene Foundation.

The first edition described diseases resulting from exposure to dusts and fumes. The second and expanded edition included a discussion of the diseases arising from chemicals.

Ramazzini's observations, in many cases, were so logical that they are accepted today, when much more information has been made available. His recommendations, of course, were mainly curative. It took a long time for industrial hygiene to reach the preventive thinking stage which today is its most important function.

J. B. A. Chevallier, who died in 1879, contributed

liberally to the literature of industrial hygiene. K. B. Lehmann, in 1884, provided much of the information that today serves as a guide for the control of industrial atmospheres. His studies were based on the toxic effects of gases on animals.

Child Labor Laws

The first recorded compensation benefit to be derived by workers in an English factory consisted of getting an owner to agree to furnish both deal and nails for the coffins of those who were killed in industrial accidents in his plant! We have come a long way, both here and in England, since that agreement was made, but progress, extremely slow at first, has only begun to accelerate in the past 20 years.

The industrial revolution in England played a great part in bringing deplorable working conditions to the attention of the country's rulers. Not even the working hours of children, who toiled in the cotton mills, were restricted before 1833, when the Factory Act was passed. This act also provided for certain inspections, and was a step in the direction of safety and hygiene as it is practiced today.

Amendments to the Factory Act in 1867 prohibited eating meals in harmful plant atmospheres, and provided for machinery guards and mechanical ventilation.

Medical inspection of English factories dates from 1897, but several states of the United States passed factory inspection legislation as early as 1877.

Progress in the United States

While the United States at first lagged behind in providing compensation benefits for injuries sustained during work, it has made significant progress in the past 40 years.

The American Association for Labor Legislation held its first national conference on industrial diseases in Chicago in 1911. A commission of leaders in chemistry, engineering, and medicine was formed for the purpose of studying the problem and of proposing methods by which industrial diseases could be abated. Only a year before, the Bureau of Mines had been created—an organization which subsequently provided significant leadership in reducing the dangers of industrial diseases. It was soon recognized as an impartial qualified research establishment where toxicities could be determined for the benefit of public and industry, so that the necessary precautions regarding handling of chemical products could be defined.

The National Safety Council was organized in 1913, and a year later the American Public Health Association incepted a section on industrial hygiene. In 1914, the office of Industrial Hygiene and Sanitation was formed by the United States Public Health Service, and the American Association of Industrial Physicians

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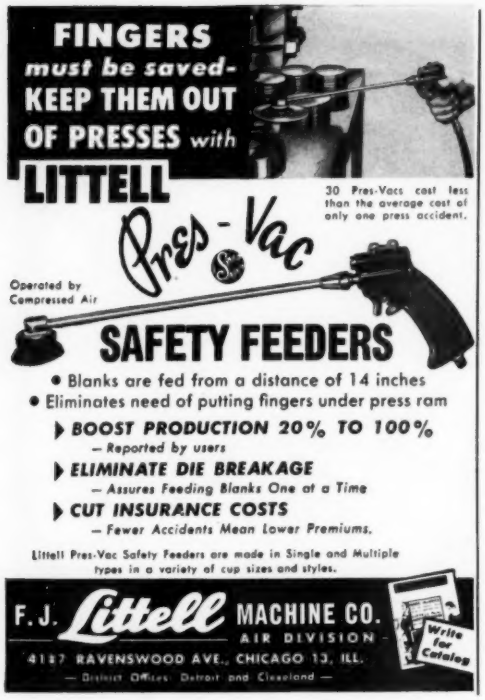
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and Surgeons was organized in 1916.

Vast production of munitions in World War I, followed by industrial ill health and increased mortality, focused the attention of public bodies and industry alike on the need for further study and technical guidance in the recognition and control of occupational diseases.

Industrial Hygiene Foundation

During the depression a number of firms having common silicosis problems approached Mellon Institute, one of the pioneers in the study of air pollution problems, and asked that research institution to conduct studies for their benefit.

The Institute welded these companies into a federation supporting a multiple fellowship, and called it the Air Hygiene Foundation. The work was under way.

The studies made by the technical personnel of the Air Hygiene Foundation soon broadened to investigations into air pollution in general, then expanded to the consideration of all phases of worker health. Its name, by 1941, was no longer indicative of the work it was doing, and so it was renamed Industrial Hygiene Foundation—a more inclusive designation.

Industrial Hygiene Foundation is a nonprofit research association of industrial groups and companies whose staff includes chemists, engineers, biochemists, and medical experts. All specialize in health problems arising in industry, for the *raison d'etre* of the Foundation is the advancement of industrial health, the improvement of working conditions, and the bettering of human relations.

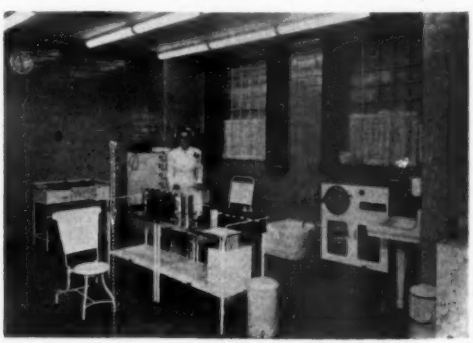
The Foundation serves more than 350 leading companies, besides various units of the United States Government, the armed forces, state and city health departments, specialists, institutions, and professional organizations. Its board of directors, of which Andrew Fletcher, president of the St. Joseph Lead Company, is chairman, is comprised of top echelon leaders in industry, science, and education.

The activities of Industrial Hygiene Foundation fall into three major categories:

1. It gives direct professional assistance to member companies in the study and solution of industrial problems.

2. It assists companies in the development of health programs as an essential part of industrial organization.

3. It contributes to the technical advancement of industrial medicine and hygiene, through research, surveys, and allied activities.



Contrasting the old and the new in first aid rooms.
Photographs by courtesy of Westinghouse Electric Corp.

The Annual Meeting

The year's work of the Foundation is pointed up by an annual meeting of impressive professional stature, which has been attended by interested persons from all over the world. The keynote speaker has always been a figure of national prominence whose message the press has broadcast as a significant contribution—in one field or another—to the improvement of working conditions.

The meeting of several days' duration, has also offered private conferences of professional specialists from member companies, whose common problems in particular industrial groups could be discussed freely—intramurally and without publicity—so that a wealth of information could be informally exchanged, information which has an important bearing on future developments in the fields of industrial medicine, law, engineering, chemistry and toxicology.

The transactions of these annual meetings have, in their published form, become a valuable addition to the literature of industrial hygiene. In addition, the Foundation publishes a monthly *Industrial Hygiene Digest* and issues special bulletins prepared under the sponsorship of the several advisory committees. Other publications include informative letters and pamphlets on subjects of current interest, plus technical papers by members of the staff.

Special surveys and studies are undertaken on an industry-wide scale to provide needed basic information. Recent examples include the completion of a comprehensive survey for a large oil company, which became the basis of an over-all industrial hygiene program.

Under an arrangement with the American Iron and Steel Institute, a broad investigation of air pollution problems is in progress, and, in this connection, counsel has been extended to the Air Pollution and Smoke Prevention Association of America in its project to alert municipalities and industry to an awareness of the need for the control of air pollutants and other nuisances.

Six medical audits have been made for member companies during the past year, and long-term chronic toxicity studies on several commercial substances have been undertaken to determine potential health hazards for both workers and users.

Engineering and Medicine

Sustained Foundation research includes investigations on the nature and mechanism of hazardous dusts, fumes, vapors, and gases, with special reference to actual conditions of plant exposure. The Foundation further makes basic studies in the physiology, toxicology, and biochemistry of physical and chemical agents, their mode of entrance into the body in relation to the physical and chemical condition of the atmos-

(Continued on page 132)

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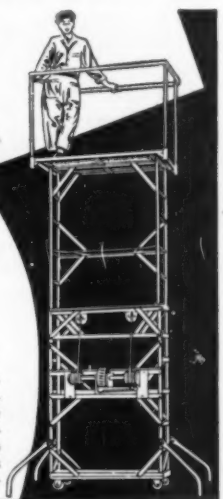

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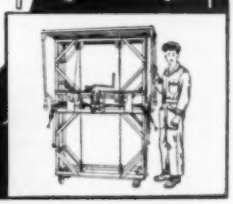

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THE INDUSTRIAL Nurse

EDITOR

ROSAMOND J. WEBSTER, R.N., A.M., Ph.D.

Progress in Industrial Nursing

AMERICAN industry is not only in the forefront of mass production, but also plays a leading part in all matters relating to the protection of the safety and health of the workers. While much has been accomplished in the past 50 years, it can reasonably be expected that much more will be done as experience, research, and the education of the workers themselves advance. The primary stimulus to the extensive introduction of medical and nursing services in industrial and commercial establishments followed the enactment of factory inspection and workmen's compensation laws. Such legislation on the continent of Europe preceded that in this country, largely because the industrial revolution ushered in by steam power took earlier hold in countries with an older industrial history.

These laws placed upon the employer practically the entire responsibility for the safeguarding of his employees against accidental injuries, and occasionally against the effects of occupational diseases as well. The enactment of the compensation laws, the first in 1911, placed a definite economic value upon the loss of time which ensued from industrial injuries and certain diseases in various types of employment. It is not to be assumed that many employers did not see the wisdom of establishing medical departments and providing the services of industrial nurses before the enactment of this type of legislation. As a matter of fact, a graduate nurse is known to have been employed by a Vermont marble company as early as 1895. However, due to the lack of large industries and a wide understanding of the services a nurse could provide in industry, only few employers thought it desirable to add such professional workers to their medical services before 1910. With agitation for workmen's compensation laws and the expansion of industries came the realization that industrial nurses, or perhaps nurses in industries, could serve a useful and desirable purpose.

Workmen's compensation laws were enacted with a rush, following a fairly long period of agitation and study. In 1911 the following states enacted such laws: Wisconsin, Nevada, New Jersey, California, Washington, Kansas, New Hampshire, Ohio, Illinois and Massachusetts. In 1912 Michigan and Arizona followed; and in 1913 seven other states enacted similar laws. Realization that equitable methods could be followed in dealing with accidents arising out of and in the course of employment, and recognition by industrial leaders that caring for accidental injuries and preventing industrial accidents were to the best advantage of the employer, the employees and to society as a whole, led to the advances that have followed once there was agreement of the essential steps that were necessary to achieve desired results.

Industrial nurses have found their respected place in industry and commerce. They represent the largest group of professional workers in industrial plants concerned with rendering health and medical services. While their history goes back less than fifty years in this country—with the comparatively few exceptions noted—they now constitute a body of well over 10,000 professional women and men who serve industry and commerce, construction and mining, and help to keep the wheels of production moving with the least delay and the minimum of absence from the job due to accidental injuries. This is the main job of the industrial nurse. She serves many other functions. Health teacher, safety guide, first aid specialist, nutritionist, cafeteria manager, big sister to emotionally disturbed women and men too, psychologist, visiting nurse, marriage counselor—that is representa-

tive of the composite industrial nurse today. She has achieved much in less than half a century. She will make an even greater contribution in the next few decades.

Nature of Shock

A FAIRLY common problem faced by industrial medical departments, especially in the heavy industries, relates to the state of shock following various accidental injuries. This problem is likewise familiar to surgeons and their associates in the operating room; to those who are called upon to deal with serious automobile accidents; and to the medical officers of our armed forces. Despite long experience with shock, its nature has not been fully understood. This has led to extensive research with animals, and the study of injured workers, soldiers and others. Until a few years ago comparatively little direct information was available regarding the physiological manifestations of shock in humans. Reduction in blood volume was commonly inferred from changes in blood concentration, as well as reduction in blood pressure. Various research developments followed from experiments conducted during World War II. As a result, research workers in this field report that it appears to be established that at least the commonest forms of human shock are associated with an appreciable reduction in blood volume and cardiac output. The reduction in blood volume occurs largely at the time of injury, and the subsequent progressive failure of the circulation is due to default of the cardiovascular system. It is generally recognized that a true state of shock is a condition which normally, but not always, develops after a hemorrhage, operation, or injury and which pursues a progressive downward course that is likely to prove fatal if untreated. Occasionally shock may occur several days after an apparent recovery. Death may follow within a few hours or a few days according to the rate of development. In the light of the serious consequences that may possibly be associated with a state of shock, all industrial nurses should be well informed of essential steps to be taken. This is especially necessary when physicians are not readily available in the workplace. Plant physicians' standing orders should be followed.

Tuberculosis in Those Over Fifty

TUBERCULOSIS continues in most communities to be a problem of serious medical, public health, and social significance. While there has been a progressive and marked decline in the mortality rate, the disease in most places is still the most fatal one in the ages during which people are most active and economically productive. Certain fallacies have been accepted by many, and even by some trained nurses, in the matter of tuberculosis. There has been a gener-

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ally held opinion that all elderly persons must cough and that such coughing is without danger to those about them. As a matter of fact, many who presumably had "bronchitis" have been found on careful sputum and X-ray examinations to be suffering from chronic pulmonary tuberculosis. In various extensive studies it has been found that the proportion of cases found increases directly with the age of those examined. Mass X-ray examinations for tuberculosis are worthwhile, particularly if all or nearly all in the middle years and beyond are examined. For a number of years the incidence of tuberculosis has been declining at a fairly steady fate among children and young people, but not in those in the upper age brackets. Several reasons have been assigned for those phenomena, among them being the rising standard of living, better housing, better nutrition, shorter working hours, safer working conditions, and better medical care for known cases. However, the aging process affects the apparent ability of the lymphatic system to prevent infection with the tubercle bacillus. It seems essential to arrange for routine chest X-ray examinations for all older workers, followed by sputum and other examinations when indicated. Incidentally, other pathologic conditions, including cancer of the lungs, will also be uncovered. Plant physicians can arrange for such a survey; local or state departments of health or tuberculosis associations can be called upon for advice and assistance.

$14,000,000 For Research

THIS is a large sum of money. Still it represents the 1950 budget appropriated by Congress for the activities of the National Heart Institute of the U. S. Public Health Service. Of course much more is being spent annually for similar research in many hospitals and laboratories. The various research projects cover not only diseases of the heart but the related conditions of hypertension and arteriosclerosis. With our aging population, and the fact that diseases of the cardiovascular-renal system rank first as the cause of death, it is apparent why so much attention and funds are at long last being applied to a study of the nature, causes, and treatment of these related diseases. There are many unanswered questions relating to diseases of the heart, hypertension, arteriosclerosis, and degenerative heart disease. The cause of arteriosclerosis is still unknown. Heredity seems to play some part, but the cause and effect relationship is still unsolved in this area. Some claims have emphasized the effects of tobacco, alcohol, hard physical labor, and emotional disturbances. Still others have tentatively explained arteriosclerosis on the basis of fatty substances deposited in the arterial wall, with cholesterol playing the major part. High blood pressure has been observed frequently during a period of emotional stress. Disturbances in the thyroid gland as well as in the prostate gland are recognized as causing elevations in blood pressure. In other words, some clues are evident as to physiological and other processes and how they influence high blood pressure, and perhaps arteriosclerosis as well. But much essential research is necessary under the best of scientific auspices if the toll of human lives from these causes is to be appreciably reduced. In the meantime, industrial nurses can play their part by referring ailing workers to their family or other physicians for such palliative treatment and professional advice as these workers may need.

Getting Results

LEADERS in the medical branches of the armed forces have stressed the remarkable achievements in the prevention and control of communicable diseases in the Far East—that is, in Japan and Korea. In both of these countries many millions have been vaccinated against smallpox, and other contagious diseases as well. Because of the unusually fine record we have achieved in the matter of smallpox, there is some hazard of letting down the bars by those who may relax vigilance. For instance, in 1946 virulent smallpox was introduced into two cities on the Pacific Coast by American servicemen returning from the Far East. In Seattle about 60 cases and 19 deaths resulted. San Francisco had fewer cases and no deaths. Both of these cities had had no smallpox cases since 1939. In both of these cities major epidemics were averted by mass vaccination programs. Still, the record of

achievement is an unusually good one. In 1950, reports a large insurance company, there were only 41 cases of the disease reported in the entire country. Up until two decades ago, the number of cases exceeded 30,000 a year. For the decade 1920 to 1929 the total came to well over one-half million cases. Of the 41 cases reported last year, seven were in Kansas, six in Kentucky and five in Oklahoma. The others were scattered through the Central and Western areas, which traditionally have had the worst records. Not a single case of the disease was reported in 1950 for any state on the Atlantic Coast from Maine to Florida. This is indeed a remarkable achievement in the field of public health. With the mass interchange of populations and the dislocations both militarily and industrially that are evident, industrial medical departments must continue vigilance against all communicable diseases. Despite the gains that have been made, the lines of prevention must be held. Questioning of prospective employees regarding their most recent effective vaccination against smallpox is indicated. Industrial nurses have their job before them. To follow up is likewise essential.

Cooperation

INDUSTRIAL organizations have experimented with many types of industrial medical service, and with industrial nursing as well. Twenty-five and more years ago groups of employers combined in Philadelphia, with the cooperation of a local voluntary health organization, in the provision of industrial medical and nursing services. These employers generally did not employ a sufficient number of workers to warrant the employment of a full-time industrial nurse for their own plants. Through cooperation, the essential needs were met. Another type of cooperative project has been developed in Georgia; the first in 1943 and another in 1950. The staff in Atlanta serves three cooperating industries employing about 750 persons. The staff consists of a full-time nurse and a part-time physician who spends 3 hours a day, 5 days a week at the clinic. Preplacement health examinations are made on all new workers, and periodic and special examinations when indicated. When in the clinic the physician also gives emergency service to all injured or ill employees in the plant first aid rooms. In his absence the nurse carries out written instructions of the physician for industrial cases, and participates in industrial health education activities. The board of directors which administers the clinic includes representatives of the participating industries, The Georgia Institute of Technology, Emory University, the Atlanta Federation of Trades, Atlanta Tuberculosis Association, two insurance companies, the local county medical society, and the Division of Industrial Hygiene of the Georgia Department of Public Health. The employers now pay 75 cents per month per employee to meet the salary of the nurse, while the physician is paid on a retainer-fee

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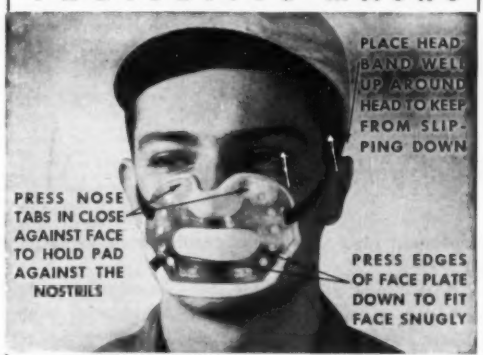
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basis. Various plans can be developed to meet local needs when the number of workers in a given plant does not justify full-time professional staffs. It may, however, take some initiative on the part of an employers association, a local or state agency, an association of industrial nurses, or a local health association to initiate similar cooperative plans.

Keeping the Worker Well

(Continued from page 127)

phere, and their subsequent possible toxic action on the body.

In the field of medicine, the Foundation is an authority on organization and administrative practices in industrial health services, layouts, personnel needs and training, interdepartmental relations, systems of record keeping, directives for medical personnel, and registered nurse service standards.

The Foundation also makes surveys of health problems, appraises existing organization, and makes recommendations for further needs. Its engineering division is equipped to give advice on control requirements for specific operations, consult on new plant design, reconstruction in existing plants, and changes in process to eliminate, or at least minimize, hazards. This division studies air pollution and its control, reviews plans for ventilating systems, and advises on special air cleaning problems.

Legal Help

Reporting of legal developments is an important function of the Foundation. Its legal committee is impressive, with some of the finest legal talent in the country contributing to the committee's work.

The Foundation is in a position to supply summaries of legislative activities pertaining to occupational diseases, compensation, and proposed legislation pertaining to industrial health. It also analyzes trends, reviews new compensation laws, and makes analyses of decisions of compensation boards which are of special significance.

In General

All this activity in industrial hygiene has been built up in a very brief period, but then the whole movement is of relatively recent origin. Even as late as 1936 the industrial hygiene activities of the United States Public Health Service were quite minor. By 1941, however, the facilities were greatly extended and the personnel increased tenfold.

The Industrial Hygiene Foundation is by no means the only organization active in the advancement of industrial hygiene. There are many others, all pursuing a worthy goal, and the Foundation fits nicely into a mosaic of industrial hygiene which includes the American Standards Association, the John B. Pierce Laboratory of Hygiene, the CIO health institute, the Saranac Laboratories, and the industrial hygiene departments of such educational institutions as Harvard, Columbia, Johns Hopkins, Yale, Toronto, California, Michigan, Minnesota, and North Carolina universities.

X-ray examinations and industrial hygiene surveys are no longer regarded with employee suspicion. This change in attitude is due to both improved practices and education. The average employee understands that such health control work operates to his advantage.

Once a sound idea has been planted, it can spread fast. The 40 years it took to bring us this far in industrial hygiene seemed slow in sprouting, but fast at their close.

The next 40 years, I am sure, will bring results even more rapidly and of much greater stature—there's still so much to be done to make the workingman's world a better place to live in. Our present accomplishments, of which industrial hygienists can justly be proud, will seem as antiquated as those of Ramazzini. And that's as it should be. We won't care. Look how far we will have come by then!

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Safety Shoe Promotion F201
General Shoe Corp. A new catalog of styles showing the complete line of Sentry Safety Shoes. Each particular style is illustrated and fully described on individual sheets which can be used as bulletin board aids in getting your employees to wear safety shoes. The catalog is so designed as to allow for inserting additional sheets as new Sentry Safety Shoes are introduced.

Rubber Footwear F202
Beacon Falls Rubber Footwear. A 4-page SM&P folder which describes and illustrates a full line of industrial rubber footwear of all styles and design. This line of rubber footwear offers such special features as: steel safety toe caps; non-skid soles and heels; extra arch support and cushioned insoles.

Safety Shoe Plan for Industry F203
Thom McAn Safety Shoe Division. 20-page booklet presents extremely useful and interesting information about two safety shoe plans: for plants located near Thom McAn Stores, and for plants which are not so located or plants maintaining their own Safety Shoe Department. Booklet also contains illustrations and descriptions of the many styles of safety shoes offered plus a geographical listing of Thom McAn outlets throughout the country.

Neoprene Soles and Heels F204
Quabaug Rubber. Small two color folder describes the oil, grease, acid and gasoline resistant features of the Armortred Neoprene soles and heels. Folder cites their application in garages, machine shops, oil fields, chemical works and railroads.

Plastic Eye Protection F205
Watchemoket Optical Co., Inc. A fully illustrated booklet offering a reprint of an article in which highly technical reports on the subject of Plastic Eye Protection have been analyzed and reduced to layman's language. This booklet is extremely valuable to safety engineers, plant managers, foremen and all others interested in promoting eye safety. The tables, charts and illustrated examples are tremendously helpful in deciding the proper protection for particular hazards. In addition, there are inserts giving details, specifications of construction and prices.

Safety Clothing for Industry F206
Industrial Gloves Co. A complete catalog with specifications and illustrations of safety clothing for arm and hand, body and leg, and foot protection. The catalog is liberally illustrated with photographs and drawings of the equipment in use and details for different industrial operations. Besides the standard equipment the catalog offers a special designing service to meet your working conditions and problems.

Eye Glass Cleaning Tissue F207
Dow Corning Corp. An interesting bulletin illustrated in two colors attractively describes the new Sight Savers cleaning stations, a handy convenient way to clean, polish and protect glass lenses. Bulletin lists, geographically, the safety supply houses that carry the product, plus a price list.

ELECTRICAL MAINTENANCE

Co-ordinated Protection of Motors ... F208
Westinghouse Electric Corp. Co-ordinated protection—interlinked protection of circuits, motors and personnel—is explained in a new 12-page hi-voltage combination starter booklet. The booklet stresses the 3-way (interlinked) protection for squirrel-cage, synchronous, woundrotor, and multi-fed motor installations. Booklet is fully illustrated with photographs and oscillograms.

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Coppus Engineering Corp. A catalog fully illustrated in 2 colors depicting the application of portable ventilators and man-cooling fans, their applications and specifications. The many photographs, graphs, tables and charts will be extremely helpful to the plant engineer in deciding the proper equipment and installation for his particular operations. Complete and detailed instructions as to specifications and application are also included.

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Flat Surface Lifting Clamp F211
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American Chain & Cable Co., Inc. A 1-page bulletin describes a new method designed to handle bundling problems. It eliminates pear-shaped links, use of pins and wire needed for binding and holding your bundling problems tight. The magnified photographs show the Acco bundling chain with the automatic lock in actual operation. The bundling chain is furnished with regular wrought iron, low carbon, high test or alloy chain, depending on the type of service and the weight of the load to be bundled.

Hydraulic Pullers & Jacks F213
Templeton, Kenly & Co. A new 8-page bulletin discusses labor-saving applications of hydraulic pullers and jacks. Fully illustrated with photographs, graphs, drawings and tables the bulletin shows how these units simplify rigging requirements and improve safety in numerous pulling, pushing and lifting operations. Complete specifications of construction and operation of these units are included.

ELECTRICAL EQUIPMENT

Civil Defense Receiver F214
General Electric Co. A catalog-sheet describes the new Civil Defense receiver, for application wherever two-way radio systems exist. The bulletin gives complete specifications and features of the new receiver, which is available in 2 models for low and high band operation. Receiver can be used to alert key agencies and personnel in a community-wide civil defense radio communications system and for remotely controlling air-raid sirens and other warning devices.

Know Your TV Set F215
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Nut and Screw Loosener F216
H. K. Porter Inc. A small fully illustrated pamphlet shows the many and varied applications of the Impak driver which loosens or tightens screws, bolts or nuts. Pamphlet also lists the many phases of industry in which this versatile tool has found acceptance.

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Fire Extinguishing Equipment F217
C-O-Two Fire Equipment Co. A new 12-page booklet illustrated in color describes the C-O-Two line of portable carbon dioxide fire extinguishers, mobile fire extinguishing systems and smoke detecting systems. The booklet gives specifications of all equipment plus accessories, such as extinguisher valves, discharge hose and horns. It is a complete guide for carbon dioxide fire protection.

Sprinkler Stoppers F218
Seeger Mfg. Co. A 6-page illustrated folder describes various types of sprinkler stoppers and tongs for shutting off individual fire sprinklers. Excessive water damage can thereby be prevented. Shown are the upright, straight and inverted types as well as firemen's tongs.

MINE SAFETY

Safety Devices for Mines F219
The American Mine Door Co. A well prepared, bound, catalog with many illustrations and editorial matter fully describing equipment and apparatus for mine safety. Such equipment as rock dusting machines, safety mine doors, track devices, track cleaners and car transfer equipment. This fully colored illustrated catalog will prove extremely helpful to those people interested in mine safety equipment.

ABOVE-GROUND SAFETY

Safety Ladders and Ladder Shoes ... F220
The Dayton Safety Ladder Co. This 1-page bulletin illustrates the varied design of safety ladders for specific application. Specifications for portable, rolling, and step platform ladders plus details on the rubber tread and steel spike ladder shoes are included. The bulletin is fully illustrated showing the particular features of each type of ladder.

GUARDS & ACCESSORIES

Punch Press Basket Guard F221
Shur-Safety Manufacturing Co. A single-page 3-color bulletin describes and illustrates the new shur-safe basket guard which is easily installed on your present equipment. The photographs and magnified blow-ups clearly show the new quick locking device and versatility of this barrier guard in use.

WALKWAY SAFETY

Aluminum Gratings F222
Irving Subway Grating Co., Inc. A 4-page folder gives full specifications as to sizes, designs, weights, and load capacities of aluminum gratings for industrial flooring, stair treads, bridge decking, walkways, etc. Data is given in chart form and photographs show typical installations.

Floor Patching F223
Stonhard Co. A 4-page folder explains the use of STONPACH for resurfacing concrete floors to prevent disintegration by oils, acids, alkalis, solvents, water and abrasive wear. The pictures show uses of the material in various industries. Other Stonhard floor and roof resurfacing materials are also described briefly.

What's New . . .

★ A Reader's Inquiry Card is provided for your convenience. Write in the code numbers to obtain illustrated descriptive literature of products listed here. ★

ANTI-FOG COVER LENS

F-300

A NEW plastic cover lens that reduces fogging and is more durable than regular glass and plastic cover lenses is announced by American Optical Company, Safety Products Sales Division, Southbridge, Mass.

Developed to protect more costly filter lenses from hot metal spatter and scratches, the new lens is formed so that the center portion is raised. The air space created between the two lenses automatically reduces fogging to a minimum. The use of fiber washers is also unnecessary with this new construction.

The new plastic lens will remain pit-free longer than glass and resists fusion of hot metals and spatter. Also, the shock-absorbing acetate cushions upon impact and does not crack. The new cover lenses may be obtained from American Optical Company branches located in principal industrial cities. For details, mark the Reader Service Card.

BOMB CURTAIN

F-301

DEVELOPMENT of a special curtain for windows to help protect industrial plants, public buildings, etc. against effects of fragmentation and atomic bombs, has been announced by E. G. Richardson, President of Strategic Products, Inc.

Called the Clark bomb curtain and perfected by Clark J. Moody, a New York oil executive, the curtain is made of a metalized fabric, to serve several purposes, according to Mr. Richardson. It will help protect against flying glass, radioactive dust and mist, blinding light from atomic rays, and fire.

The curtain is said to be most effective at distances of from 2,600 feet to eight miles away from the explosion.

"At 2,600 feet from an atomic blast," said Mr. Richardson, "we feel the curtain will improve the margin of safety to life and property from flying glass, gamma rays and other destructive forces which accompany such an explosion."

Mr. Richardson pointed out that the curtain will not protect against a direct hit, nor is it likely to be of much help close to the center of the blast. The curtain's fabric is tough, waterproof and fire resistant. It is metalized with molten aluminum and lead.

When not in use, the curtain rolls up tightly against the upper part of the casement like a window shade and is concealed behind the draperies. It fits to a special frame installed into the casement. Zippers on the sides of the curtain speed its readiness. In the event of an air raid alarm the curtain can be dropped and secured in less than forty-five seconds.

Curtains will be made available first for public buildings, like hospitals, schools, institutions and municipal structures, said Mr. Richardson. Production for general distribution will follow. For details, mark the Reader Service Card.

WALL WASHING MACHINE

F-302

A MACHINE that cuts wall washing time and eliminates streaking, dripping and drop cloths, is offered by Quaker Maintenance Company, Inc. of N. Y. Called the "Wallmaster," the machine is designed to wash, rinse and dry all types of interior wall surfaces, revitalizing the paint, and restoring the original lustre.

Special cleaner, and rinse water are applied to wall surfaces with large light-weight trowels, covered with heavy-weight terry cloth pads. The cleaner and rinse are fed into the trowels by fingertip control from pressure tanks. The machine is entirely mechanical, and uses no electricity.

A new, exclusive attachment permits cleaning of rough, uneven surfaces such as corrugated metal ceilings, window trim, pipe risers, molding, painted rough brick, tile and marble. The attachment (pat. appl. for) consists of an ingenious valve constructed on a small aluminum plate which fits conveniently inside the palm. A synthetic sponge is the basis of feeding the cleaning solution and rinse. Fingerless terry cloth mitts are used over both sponge attachments. These mitts are washable, and last for several months.

For details, use the Reader Service Card.

NEW PLASTIC GOGGLE

F-303

THE Methaspec Eye-Saver is the newest plastic goggle development of the Watchemoket Optical Co., Inc. of R. I. Designed to give workers the utmost in comfortable, correct-fitting eye protection, as well as complete safety, the new goggle has several outstanding features.

1. *Adjustable Temple Length.* Simply by pushing or pulling each temple in or out, the wearer can adjust the temple

length to suit his individual requirements.

2. *Adjustable Lens Angle.* To fit every face, lens angle may be adjusted by holding lens with one hand and moving temple (at hinge) up or down with other hand.
3. *Reversible Bridge.* For added comfort, the bridge is thick on one side, thin on the other, and may be reversed so that either side touches wearer's nose.

The Methaspec goggle is made of light UVA Plexiglass only 1/10" thick, and weighs only 1¼ ounces. Yet it has great impact strength and exceeds Federal specifications for drop ball and drop needle tests for tempered glass. Ultraviolet restraint is 100% in range below 3400 ang. units (the range harmful to human eye). Rolled front design, curved one plane only, allows wide range of vision. Each goggle is individually boxed. For further details, use the Reader Service Card.

CONDUCTIVE FLOOR & PERSONNEL GROUNDING DEVICE

F-306

A COATING which makes existing floors conductive is now available with finish coat in four colors—grey, green, red and brown. Called CONDUCOTE and made by the Walter G. Legge Company, it is designed to prevent explosions and fires caused by static electricity. It is said to be effective on all types of flooring. The manufacturers recommend its use in hospitals, factories, textile mills and all buildings where flammable gases exist or where flammable materials are stored.

A plastic-like composition, Conducote is applied to flooring with a brush. Thinner and Finish are supplied. Minimum of four coats of Conducote, as well as two of Conducote Finish, with ample drying time between applications, is recommended. The product meets requirements of NFPA code #56. It is listed by Underwriters' Laboratories, Report #3836, and by Electrical Testing Laboratories Report #340290.

To be used in conjunction with conductive floors, NoSTAT, a grounding device for personnel, is manufactured by the same company. Made to assure drainage of electric currents which store up in the human body, NoSTAT is worn on the leg and shoe.

A floor contact button, which clamps on the arch of the shoe, is connected by a bead-chain to a small metal plate worn around the leg in an elastic garter. NoSTAT is adjustable to fit any size or type of shoe and is said to wear comfortably on the legs of either men or women. The elastic garter can be worn either below or above the knee. A sturdier model is also available for heavy industry. For complete details request information on the Readers Service Card.

WHEELED DRY CHEMICAL EXTINGUISHER

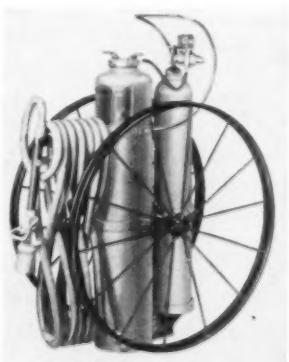
F-305

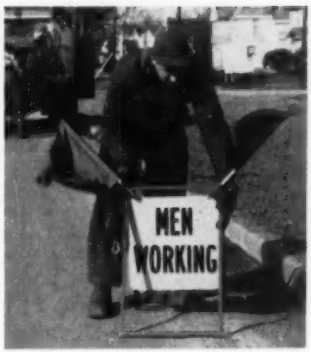
WALTER Kidde & Company, Inc., announces a wheeled dry chemical fire extinguisher with 150-pound powder capacity, for combating flammable liquid (Class B) and electrical (Class C) fires in industrial plants, textile mills, airports, garages, refineries, and utility power properties. The new extinguisher, recommended for use against fires too severe for extinguishment by smaller units, has several features that make it easy to handle, highly dependable, and safe.

Mounted on two wheels, and properly balanced to permit one man mobility, are two large upright steel cylinders. The larger cylinder contains 150 pounds of fire-smothering dry chemical, the smaller cylinder holds nitrogen under pressure of approximately 2000 pounds per square inch.

To operate, a valve on top of the nitrogen cylinder is opened. This admits the nitrogen to the powder chamber through a normally-open valve, and pressurizes the dry chemical for discharge. A pre-set regulator maintains constant pressure within the dry chemical cylinder during discharge, and a safety valve prevents damage to the powder cylinder if the pressure should exceed that for which the regulator is set.

On the end of a 50-foot heavy duty hose is a discharge nozzle with stirrup-type control lever. The lever has three positions: "Off," "Fan," and "Straight," for control of the powder stream.





WARNING SIGNS

F-306

EXPANDED operations have been announced by Eastern Metal of Elmira, Inc., makers of steel safety signs. Recently incorporated, the organization was formerly known as Eastern Metal Products Co.

The new "A" Standard produced by Eastern Metal has proved to be particularly popular. It is a new type of safety standard (patent pending) for most effective warning of motorists approaching a work area. As shown in the photograph, the durable angle iron frame opens into a wide base so that the standard won't blow over in strong winds or the backwash of passing trucks. Two red flags mounted diagonally complete the striking appearance of the standard. The free-swinging sign in brilliant yellow has black lettered legends on both sides. Several different legends are available and can be reflectorized with Scotchlite for night or cloudy day display. Both the sign and the frame which is in brilliant red have a special flexible baked enamel resistant to weather and stone bruises. The "A" Standard folds up neatly and locks in place for convenient carrying and easy storage; flags are also removable, so a minimum of space is required.

HEAT RESISTANT GLOVES

F-307

OVER a period of ten years, the Liberty Dressing Co., Inc. of N. Y. has been developing an impregnated leather with greater resistance to heat. The company has announced a heat-resistant leather glove that withstands temperatures over 800 degrees F. for short periods of time. The high insulation of the material permits the handling of hot objects for a longer time than with ordinary gloves.

The gloves, available in band and gauntlet styles, are made up in a number of different thicknesses and designs to fulfill the temperature and heat demands of specific operations. The material is flexible for the handling of small objects and tools. For details, send in the Reader Service Card, requesting information.

Story of Safety

(From page 121) industry. Prior to World War II, women's role in industry generally was confined to small manufacturing plants, particularly in the garment trades.

Manpower shortages on the production front changed that scene. Wherever natural aptitude, finger dexterity and special training could replace brawn, women did a production job to the undying glory of their sex. They are back on the scene today ready to repeat that job in the interest of their country's security.

The emancipation of women in industry brought for those who sought it a new found freedom from the monotony of household drudgery and economic shackles. The safety field, quick to recognize trends, came forward immediately with safeguards in the form of styled protective clothing, safety shoes, caps and turbans and even protective skin creams. Today, glamour need not end with the eight o'clock whistle.

Once more those charged with the maintenance of production through safety must recognize the vital contribution made by the millions of American Rosies. Our country needs their skill, their dexterity and their superb loyalty as never before.

The development of new safety devices and the improvements in products designed to keep pace with industry's new hazards is the constant goal of engineers and safety appliance manufacturers.

New industrial processes serve as a never-ending challenge to the safety and maintenance field. Through the medium of well publicized state, regional and national safety conventions, there is on display an almost year-round exhibit of safety equipment and products from one end of the country to the other.

Safety's New Concept

American industry has come to realize the vital relationship of safe, well maintained working conditions to efficient production.

The comparatively small band of safety leaders has won new recruits to the cause of safety maintenance. In devoting their lives to the service of American industry, often against almost heartbreaking odds, they have made all industry aware of safety's role in preventing tragedy, reducing losses and increasing production.

We can now add operating officials, executives and plant superintendents to the hard core of technically trained experts who form the "grass roots" of safety. They also are responsible for a large part of the growth factor in safety.

We venture to predict once again that in the ensuing years, everyone will concede that safety and good maintenance are Siamese Twins. Without one the other can not exist —and both are necessary to efficient production.

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when the welder must wear a Hard Hat...

give him a CESCO *Dual Protector*

FOR **Arc Welding**

CESCO *Hat-n-Shield*®

● Consists of choice of CESCO Helmets and Fiberglas Hat. Rustproof, adjustable, easy-tilt mechanism holds shield in any position. Spring clip connectors permit fast, easy detachment of shield from hat which can be worn separately.

FOR **Gas Welding**

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● A combination of Model 542 CESCO *Speed-Shift* Goggles and Fiberglas Hat. Ball-and-socket mechanism for quick flipping of goggles onto hat or into position. Goggles can be flipped to top of hat when wearer does other work.

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Now . . . CESCO offers Dual Protectors . . . Fiberglas Hats with any type CESCO Helmet or No. 542 Goggles. Each is a completely adjustable unit . . . as easy to put on as the hat alone. No need to change headgear.

FIBERGLAS HAT Light and cool . . . safer than stainless steel. Waterproof . . . for all-weather wear. One size for all workers. Headband and hammock drawstring quickly adjustable for perfect fit. They're as comfortable as an old felt hat.

CESCO makes a complete line of industrial protective equipment in addition to ***Hat-n-Shield*** *and* ***Hat-n-Gogs*** *Dual Protectors. For full information on Dual Protectors or other equipment see your CESCO distributor . . . or write us for literature . . . today.*

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(H. W. & D. BRAND OF MERBROMIN, DIBROMOXYMERCURIFLUORESCEIN-SODIUM)

Do not neglect wounds, however small; even scratches and small cuts may become infected if they are not promptly and properly treated.

'Mercurochrome' (H.W. & D. brand of merbromin, dibromoxymercurifluorescein-sodium) is one of the best antiseptics for first aid use. It is accepted by the Council on Pharmacy and Chemistry of the American Medical Association for this purpose.

The 2% aqueous solution is not irritating or toxic in wounds; minor injuries are reported more promptly when 'Mercurochrome' is the routine antiseptic, because treatment is not painful.

'Mercurochrome' solution keeps indefinitely; the color shows where it has been applied.

Physicians have used 'Mercurochrome' for more than 28 years.

Be sure to include 'Mercurochrome' in your first aid supplies.

*Reg. U. S. Pat. Off.

HYNSON, WESTCOTT & DUNNING, INC.

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